

GLOUCESTER HARBOR

MASSACHUSETTS

SURVEY

(REVIEW OF REPORTS)



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
DECEMBER 21, 1960

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R 5/61

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND

CORPS OF ENGINEERS

424 TRAPELO ROAD

WALTHAM 54, MASS.

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO.

NEDGW

21 December 1960

SUBJECT: Survey (Review of Reports) on Gloucester Harbor,
Massachusetts

TO: Chief of Engineers
Department of the Army
Washington, D. C.
ATTN: ENGCW-P

1. The subject report is submitted in accordance with EM 1120-2-101, Paragraph 1-126. There are forwarded under separate cover:

- a. Copies 1 to 10 of subject report with letters of transmittal.
- b. Three (3) copies of a reduced display map.
- c. Three (3) copies of a draft of the public notice of the report.
- d. Five (5) copies of supplement S-1148, in addition to those bound in the report.
- e. One (1) copy of the public hearing held 7 November 1956, with five (5) copies of the public notice and one (1) copy of the mailing list.

2. Copies of the report, with other data required by EM 1120-2-101 are being forwarded directly to the Board of Engineers for Rivers and Harbors.

5 Incl (u/s/c)
As listed above

SEYMOUR A. POTTER, JR.
Brigadier General, U. S. Army
Division Engineer

SYLLABUS

The Division Engineer finds that channel and anchorage facilities at Gloucester Harbor, are inadequate for present and prospective commercial vessel traffic. He also finds that the benefits to be realized are sufficient to warrant Federal participation in further improvement. He therefore recommends modification of the existing project to provide a 20-foot-deep entrance channel extending north and south of the State Fish Pier, and 16- and 18-foot-deep branch channels into Smith and Harbor Coves, respectively, with adjacent 15- and 16-foot-deep anchorages. The estimated first cost of construction is \$1,100,000 exclusive of \$20,000 for preauthorization and \$6,000 for aids to navigation. The benefit-cost ratio is 2.7.

The modification is recommended subject to the requirement that local interests provide the lands, easements, and rights-of-way as required, hold and save the United States free from damages that may result from construction and maintenance of the project, and maintain commensurate depths in berthing areas.

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Maps accompanying report:

File No. 261-Dr. - 36 Key Map
 File No. 257-Dr. - 36 Survey Map
 File No. 250-Dr. - 36 Probing Map and Table (2 sheets)

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM 54, MASS.

NEDGW

21 December 1960

SUBJECT: Survey (Review of Reports) of Gloucester Harbor, Massachusetts

TO: Chief of Engineers, Department of the Army, Washington, D. C.
ATTN: ENGCGW-P

AUTHORITY

1. This report is in review of previous reports and is submitted in compliance with the following resolutions adopted March 30, 1955:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors be and is hereby requested to review the reports on Gloucester Harbor and Annisquam River, Massachusetts, published in Rivers and Harbors Committee (House of Representatives) Document Numbered 39, 72nd Congress, 1st Session, and other pertinent reports, with a view to determining whether the project depth of the existing project should be increased to 20 feet at this time."

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, that the Board of Engineers for Rivers and Harbors be, and is hereby requested to review the reports on Gloucester Harbor and Annisquam River, Massachusetts, published in House Document Numbered 329, 77th Congress, 1st session, and other pertinent reports, with a view to determining whether depth of the existing project should be increased to 20 feet at this time."

PURPOSE AND EXTENT OF STUDY

2. The purpose of this study is to determine the need and justification for deepening and widening the harbor channels particularly in the interest of the fishing commerce. Since a separate study has been authorized for the Annisquam River, this report shall pertain to Gloucester Harbor only.

3. A public hearing was held on November 7, 1956 in Gloucester, Massachusetts in order to obtain the views of local interests. A navigation questionnaire dated October 15, 1956 and a series of conferences held with local interests at intervals from November 7, 1956 to February 24, 1960 have been the basis for substantiating the waterborne commerce and boating activities of the harbor. Local interests were consulted to obtain their comments on the results of the study.

DESCRIPTION OF NAVIGATION CONDITIONS

4. Gloucester Harbor is located at the southern extremity of Cape Ann about 25 miles northeast by water from Boston Harbor. It actually consists of an outer and inner harbor. The outer harbor is a large rectangular body of water nearly 1,000 acres in area at the 18 foot contour and extending approximately 3,100 yards southwesterly across its mouth from Eastern Point to Norman's Woe, a rocky promontory on the opposite shore and about 3,700 yards inland to the mouth of the inner harbor. A breakwater extends approximately 2,250 feet northwesterly into the outer harbor from Eastern Point to Dog Bar. The outer harbor contains two coves and two minor harbors. Norman's Woe Cove and Freshwater Cove are located in the western portion of the harbor. Southeast Harbor is located north of Eastern Point and southeast of Ten Pound Island. Western Harbor is located in the northwestern portion of the outer harbor and provides the entrance to Blynmen Canal.

5. An unimproved public landing exists in Freshwater Cove. Access to Freshwater Cove is by means of a single lane, unimproved gravel road. The road has no turn-around consequently, vehicular traffic to the water's edge must back out for the full length of the road. There are no "off-the-road" parking facilities. A small number of private piers are located along the shore of the cove.

6. The inner harbor consists of an area of about 52 acres at the 18 foot contour and contains two coves, Harbor Cove and Smith Cove, and extends about 400 yards across its mouth in a northwesterly direction from Rocky Neck to Fort Point and about 1,500 yards inland to the head of navigation. Gloucester's ocean going commerce is conducted in the inner harbor.

7. Entrance can also be made from the eastward by the Annisquam River and the Blynman Canal. The latter joins Western Harbor in the northwest section of the outer harbor approximately 900 yards from the mouth of the inner harbor.

8. Gloucester Harbor and its approaches have very broken ground and many unmarked rocks and ledges making careful navigation necessary especially in foggy weather. Tidal currents are negligible, setting in and out of the harbor with comparatively small velocities. The harbor is protected on the

east and southeast by the southerly arm of Cape Ann, but is exposed to southerly storms. The mean range of tide is 8.7 feet and the spring range is 10.1 feet.

9. The locality of Gloucester Harbor is shown on U.S. Coast and Geodetic Survey Charts 233, 243 and on maps accompanying this report.

TRIBUTARY AREA

10. The area immediately tributary to Gloucester Harbor is the city of Gloucester located on Cape Ann in Essex County, Massachusetts. It is one of the largest fishing ports in the United States. The principal industries are fishing, fish imports from foreign countries, extensive boatyard and marine railway activity and manufacturing. In addition to the commercial activity in Gloucester, the entire Cape Ann area constitutes a well developed recreational area with many hotels and some excellent beaches. The normal population of 25,000 is greatly increased by an influx of summer residents.

11. The locality is served by the eastern division of the Boston and Maine Railroad and by a network of improved roads and highways.

BRIDGES AFFECTING NAVIGATION

12. Although no bridges cross any portion of the waterway under consideration for improvement there are three structures within the tributary area proper. The Blynman Canal which connects the Annisquam River with Gloucester Harbor is crossed by a double-leaf bascule highway bridge with a horizontal clearance of 40 feet and a closed vertical clearance of 7.5 feet at mean high water. About 4,000 feet from Gloucester Harbor a single-leaf bascule railroad bridge crosses the Annisquam River with a horizontal clearance of 40 feet and a closed vertical clearance of 16.6 feet at mean high water. Approximately 8,000 feet from the harbor the river is crossed by a fixed highway bridge with a horizontal clearance of 146 feet and minimum vertical clearance of 65 feet at mean high water.

13. A submarine cable to transmit electric energy at 4,160 volts extends across the Inner Harbor in a westerly direction from the State Fish Pier. This cable is owned and maintained by the Merrimack-Essex Electric Company.

PRIOR REPORTS

14. Gloucester Harbor and the Annisquam River have been the subject of numerous reports since 1872. These are described in the following table and were all favorable reports resulting in authorization for further improvement.

REPORTS ON GLOUCESTER HARBOR

<u>Published In Document No.,</u>	<u>Improvement Authorized</u>	<u>Date of R&H Authorizing Act</u>
H. Ex. Doc. No. 60 41st Cong. 3rd Sess. and annual report of 1871	Removal of boulders in Inner Harbor, and for construction of breakwater over Dog Bar	June 10, 1872
H. Ex. Doc. No. 169 48th Cong. 2nd Sess. and annual report of 1884-85	Clearing of Babson's ledge and further surveys	August 5, 1886
Annual Report, 1887, Page 503	Removal of ledges and dredging, in Gloucester Harbor	August 11, 1888
H. Ex. Doc. 56 48th Cong. 2nd Sess. and annual report of 1885, page 534	Construction of breakwater at entrance to Gloucester Harbor from Eastern Point to Round Rock Shoal	August 18, 1894
Annual Report 1902, page 89	Termination at Cat Ledge of breakwater authorized by act of August 18, 1894	June 13, 1906
H. Doc. 1112, 60th Cong. 2nd Sess.	Removal of 8 ledges in Gloucester Harbor	June 25, 1910
Rivers and Harbors Committee, H. Doc. 39 72nd Cong., 1st Sess.	Dredging in Annisquam River and Removal of a ledge in Gloucester Harbor near the entrance to Annis- quam River	August 30, 1935
H. Doc. 329, 77th Cong. 1st Sess.	Dredging 8 foot anchorage area in Lobster Cove, Annisquam River	March 2, 1945

PRIOR CORPS OF ENGINEERS' PROJECT

15. Projects for Gloucester Harbor were adopted by River and Harbor Acts of June 10, 1872, August 5, 1886 and June 3, 1896. These authorizations provided for the removal of boulders, the clearing of ledge and the construction of a breakwater over Dog Bar. There were no previous projects for Annisquam River.

EXISTING CORPS OF ENGINEERS' PROJECT

16. The existing project was first authorized by a River and Harbor Act of August 11, 1888 and further improvements were authorized by subsequent acts. The project provides for the following improvements to Gloucester Harbor.

a. A rubblestone breakwater 2,250 feet long surmounted by a superstructure of dry walls of heavy split stone enclosing a core of rubblestone from Eastern Point over Dog Bar to Cat Ledge.

b. The removal of three ledges in the inner harbor, one to 12 feet and two to 15 feet in depth at mean low water, and five ledges in the outer harbor, four to 18 feet and one to 25 feet in depth at mean low water.

c. Removal to a depth of 15 feet below mean low water of ledges and boulders obstructing the approach to the wharves between Harbor Cove and Pews Wharf near the head of the inner harbor and dredging to 15 feet below mean low water of the channel leading past the wharves.

d. Dredging Harbor Cove to a depth of 10 feet at mean low water.

17. The existing project also provides for an 8-foot channel through the Annisquam River. Modification of this improvement will be considered under the separately authorized study of that waterway.

18. The existing project was completed in November 1958, with the dredging of an anchorage area at the entrance of Lobster Cove in the Annisquam River. The removal of all ledges and boulders in Gloucester Harbor between Harbor Cove and Pews Wharf and other obstructing rocks was completed in 1894; and the removal of pinnacle rock was completed in 1896. The breakwater, completed in 1905, was repaired in 1940 and is in good condition. The removal of all ledges to project depth was completed in 1916.

19. The controlling depths over ledges in the outer harbor in 1916 were from 18 to 25 feet. The controlling depths over ledges in the inner harbor are as follows:

a. In 1959, 15.5 feet over ledge C; 15.2 feet over ledge A and 15.3 feet over ledge B.

b. In 1959, 16 feet in the channel leading past the wharves and 15 feet in Harbor Cove.

c. In 1958, 8 feet in the Lobster Cove area.

20. The total expenditures from regular funds, under the existing project, have been \$1,054,277 of which \$737,850 was for new work and \$316,427 was for maintenance. In addition, the sum of \$25,000 was expended from contributed funds. The average annual maintenance cost during the past five years was \$25,000.

LOCAL COOPERATION ON EXISTING AND PRIOR PROJECTS

21. In compliance with the River and Harbor Act of March 2, 1945 local interests have contributed \$25,000 of the initial cost for the improvement to Lobster Cove and all required conditions of local cooperation have been met. There is no record of Federal requirements pertaining to Gloucester Harbor proper.

OTHER IMPROVEMENTS

22. Gloucester Harbor has a history of improvement by the City of Gloucester and the Commonwealth of Massachusetts. The Division of Waterways, Public Works Department, Commonwealth of Massachusetts has expended approximately \$2,000,000 for improvement of Gloucester Harbor, including construction of a State Pier and fish processing plant which are leased to local interests. Other improvements to the harbor and the dates of completion thereof are as follows:

a. In 1952, the dredging of 22,000 cubic yards of material from an area northeast of the State Fish Pier in Gloucester Harbor to provide a depth of 6 feet at mean low water.

b. In 1955, the dredging of a total of 104,500 cubic yards of material from the following areas to provide the depths indicated:

(1) Along the east side of the State Fish Pier, for a distance of 250 feet, to provide a depth of 15 feet at mean low water.

(2) Along the west side of the State Fish Pier, for a distance of 700 feet, to provide a depth of 21 feet at mean low water.

(3) Along the wharves on the west side of the Inner Harbor, for a distance of approximately 1,250 feet, to provide a depth of 20 feet at mean low water.

c. In 1956 and 1957 the dredging of a total of 65,000 cubic yards of material from the following areas to provide the depths indicated:

(1) The easterly side of Smith's Cove to provide a depth of 6 feet at mean low water.

(2) Harbor Cove to provide a depth of 18 feet at mean low water.

(3) The Inner Harbor, northeasterly of the State Fish Pier to provide a depth of 6 feet at mean low water.

d. In 1959, the dredging of an area north of Buoy N-18, on a line with Buoy No. 20 to tie-in to the dredged area at the Quincy Market Cold Storage and Warehouse Company Wharf. The dredging provides a depth of 22 feet at mean low water.

e. The city of Gloucester and the Commonwealth of Massachusetts have jointly expended an amount in excess of \$400,000 for dredging work since 1952. In 1960 the Massachusetts House of Representatives passed, and sent to the Senate a bill that could provide approximately \$500,000 for dredging in the Inner Harbor Channel. The bill recommends dredging the channel to a depth of 20 feet at mean low tide to a width of 200 feet from Ten Pound Island to the Parker Street end of the State Fish Pier, and dredging to provide a mooring area and turning basin.

TERMINAL AND TRANSFER FACILITIES

23. Gloucester has approximately 75 piers and wharves, 90% of which are used in some connection with the fishing industry. Of these, 32 with a total frontage of about 6,600 feet, are considered commercially important by local interests. All are located within the Inner Harbor. A town landing 20 feet by 30 feet with a runway from wharf to float is located at the head of Harbor Cove and used for unloading passengers. In addition there are 6 boatyards, 4 of which have marine railways, the largest having a capacity of 650 tons.

24. Nine fish purchasing firms have a total daily freezing capacity of 537 tons and a total cold storage capacity of 15,800 tons. Additional cold storage facilities completed in 1960 provide an additional cold storage capacity of 3,000 tons.

25. In addition to the existing facilities, additional terminal facilities are currently being developed for completion during 1961. Present planning indicates that the proposed facility will be located on the southern shore of the channel southeast of the State Fish Pier and will have a daily freezing capacity of 35 tons and a daily cold storage capacity of 5,250 tons. The future construction of one or two additional fish processing plants in Gloucester is also under consideration. When completed, the proposed terminal facilities will represent an investment in the fishing industry of over two million dollars.

26. The private wharf owned by the Quincy Market Cold Storage and Warehouse Company was improved in 1958 by dredging an area 425 feet by 80 feet fronting the wharf to a depth of 21 feet below mean low water.

27. There are no railroad sidings available at any of the wharves and docks in Gloucester Harbor. The local network of streets and highways provides ready access, by truck, to all major road and highway systems serving the area.

28. Of the 75 wharves in the harbor, 2 are owned by the city. The fish pier is owned by the Commonwealth of Massachusetts and leased to the city. The remaining 72 wharves are privately owned and are not available to the public. In addition to the aforementioned wharves, there are two commercial wharves on the east bank of the Annisquam River. These facilities are considered adequate for the existing commerce of the port. A description of wharves and boatyards is given in Appendix B.

IMPROVEMENT DESIRED

29. At a public hearing held on November 7, 1956 at Central Grammar School, Gloucester, Massachusetts, local interests expressed their desires concerning the improvement of Gloucester Harbor. The desired improvement together with statistical data pertinent thereto was set forth in detail in the form of a brief in behalf of the City of Gloucester, by the Gloucester Harbor Improvement Committee. A digest of the brief is contained in Appendix A. Local interests indicated that the desired improvement is considered essential to the continued expansion of the fishing industry and to the elimination of navigation hazards to shipping.

30. Representatives of the Commonwealth of Massachusetts, Public Officials of the City of Gloucester and representatives of fishing, yachting and maritime interests reflected local opinion favoring the improvement. Their comments are summarized in Appendix A.

31. In addition to the desired improvements requested by the Gloucester Harbor Improvement Committee, local individuals requested the dredging of a channel to a pier at Freshwater Cove. Proponents of this improvement contend that a petition of fifty-six names was submitted to the City Council requesting such dredging. They further claim that there is a public landing in the Cove which cannot be utilized under existing conditions.

32. On March 30, 1956, the Division Engineer issued a permit authorizing the City of Gloucester to construct and maintain a stone pier and fill in Freshwater Cove at the terminus of Waterside Lane, designated as "Landing No. 17, City Landing." The proposed stone pier and fill has not been constructed and the Division Engineer's permit expired on December 31, 1959. Construction of an appropriate public landing and improvement of Waterside Lane by local interests would be a requirement for any Federal improvement. In view of the present private nature of the Cove and the lack of City interest in developing public landing and shore facilities in this area at this time, no further consideration has been given to the improvement of Freshwater Cove.

33. On May 12, 1959 local interests submitted a supplement to the brief dated November 7, 1956 setting forth changes in the desired improvements. These changes reflect harbor improvements completed by local interests subsequent to the hearing held in 1956.

34. The revised scope of desired improvements to Gloucester Harbor, as set forth in the supplement to the basic brief, is as follows:

a. Dredging main channel beginning at #10 Buoy, 244° true from Ten Pound Island Light and continuing to and along the Northerly side of the State Fish Pier to a depth of 22 ft. at m.l.w. and to a width of 600 ft., with removal of all ledges and underwater obstructions to this depth and width. It is noted that the 1956 Brief requested a m.l.w. channel depth of 20 ft. The mean low water minimum channel depth presently requested is 22 ft.

b. Removal of ledge presently marked by N-20 (formerly N-16) Buoy and then moving the Buoy Southeasterly to widen the channel at that point.

c. Removal of ledge opposite the Empire Fish Company in Harbor Cove. The dredging of Harbor Cove to a depth of 19 ft. at m.l.w. referred to in 1956 Brief since has been completed by the Commonwealth of Massachusetts.

d. Dredging to a depth of 16 ft. at m.l.w. the area southerly of the State Fish Pier adjacent to the finger pier wharves and extending outward toward the opposite shore.

e. Dredging to a depth of 22 ft. at m.l.w. a turning basin approximately 350 yards square between Buoy N-14 and Buoy N-20 (formerly N-16) extending into the approach to Smith's Cove and continuing to a point just beyond the facilities of the Rocky Neck Ship Yards, Inc. A depth of 22 ft. at m.l.w. presently is requested to conform with requested channel depths. The 1956 Brief requested a m.l.w. depth of 20 ft.

35. At a conference held at the New England Division Office on February 24, 1960, local interests indicated that additional terminal facilities for Gloucester Harbor are currently being developed for completion in 1961. In view of this development, local interests requested that consideration be given to additional dredging of the channel southeast of the State Fish Pier to provide a depth of 20 feet at mean low water. Local interests contend that the additional facilities will result in an increase of 50% in foreign vessel traffic. Proponents of the additional improvement anticipate that the increase in foreign traffic will include a larger number of vessels having a draft ranging from 16 to 21 feet than are now using the port. Based upon the 1959 foreign traffic statistics, 290 vessel trips were made by boats having a draft ranging between 16 and

21 feet therefore, the projected volume of foreign traffic subsequent to completion of the proposed facilities will be approximately 430 vessel trips annually. Since all prospective future shipping will utilize the Inner Harbor channels on both sides of the State Fish Pier, the proponents requested that consideration be given to dredging the channel southeast of the State Fish Pier to a depth of 20 feet.

36. Local interests have indicated that vessels of American registry landing cargoes at Gloucester Harbor have drafts ranging from 6 to 17 feet and vessels of foreign registry have drafts ranging from 9 to 20 feet. American and Canadian Naval vessels extending courtesy visits to Gloucester Harbor have drafts of 20 feet. Local interests have further indicated that the present condition of the harbor has resulted in the grounding out of the larger draft vessels and in damage to ships striking ledge. The existence of this ledge is considered a constant threat to navigation. Proponents expressed the belief that the desired improvement will eliminate the possibility of vessels grounding out; will permit the docking of larger fishing vessels at any time irrespective of tides, and will eliminate the possibility of vessels striking ledge. They contend that the improvement will also eliminate a shoaling tendency in the vicinity of the finger pier wharves; will provide additional mooring and anchorage areas and will facilitate the maneuvering and docking of vessels of larger draft.

37. In addition to benefits to shipping, commerce and the general economy of the north shore area, local interests contend that benefits will also accrue to the smaller vessels transiting the northeast coast. The desired improvements will provide a mooring area for deep draft yachts, sport cruisers and sailing craft from various state and out-of-state yacht clubs seeking refuge from northeast gales. The improvement will also provide additional anchorage space for the increasing number of local and transient craft which avail themselves of Gloucester's facilities.

38. On March 2, 1957, the Gloucester City Council ordered that, if so authorized by the Massachusetts General Court, it will appropriate an amount not to exceed \$750,000 for the acquisition of commercial pier facilities and the construction of warehouses and other facilities thereon for use in the development of commercial shipping. The amount to be appropriated by the City of Gloucester is dependent upon the availability of matching funds from the Commonwealth of Massachusetts and additional improvement of Gloucester Harbor, by modification of the existing project, to provide a channel 300 feet wide to an average depth of 32 feet at mean low water, extending from the harbor entrance to the proposed pier. By letter dated April 23, 1957, the Commonwealth of Massachusetts indicated its willingness to request a special item in the Capitol Outlay Program, in the amount of \$750,000 for use as matching funds for the proposed new facilities.

EXISTING AND PROSPECTIVE COMMERCE

39. Waterborne commerce in Gloucester Harbor has averaged approximately 156,600 tons annually in combined shipments and receipts in the last ten years. Peak years were 1957 with 197,762 tons, 1956 with 188,723 tons and 1958 with 183,977 tons. The smallest amount of commerce handled was 91,260 tons in 1953. Waterborne commerce statistics indicate that fish or fish products, and petroleum products constituted approximately 81% and 12% respectively of the total tonnage of the 1958 freight traffic with the remainder variously divided among meat and animal products, fruits, vegetables, paper products, lumber products, machinery and manufactured and fabricated products.

40. Statistics indicate a gradual increase in foreign imports and a substantial increase in foreign exports. Import-export tonnage for the years 1956, 1957 and 1958 is as follows:

<u>Year</u>	<u>Tonnage</u>	
	<u>Foreign Import</u>	<u>Foreign Export</u>
1956	33,547	3,896
1957	36,285	5,569
1958	37,668	10,006

Local interests have indicated that, of the total foreign imports in 1958, 32,265 tons comprised frozen fish blocks which were subsequently processed into fish sticks at Gloucester plants and at plants throughout the country. For the year 1959, local interests indicates that foreign registered vessels, making 126 vessel trips to Gloucester, discharged 35,929 tons of cargo at that port.

41. Receipts and shipments of commodities in Gloucester Harbor for the period 1946-1958 are shown in the following table.

TABLE I

RECEIPTS AND SHIPMENTS OF COMMODITIES

<u>COMMODITY</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
Fish & Fish Products	147,491	126,930	98,685	150,553	112,279	74,612	117,863	155,320	163,911	167,168	149,341
Inedible Animal Products	76	1,388	7,870	1,476	3,247	403	274	1,274	2,569	3,378	2,206
Lumber Products	691	502	600	1,045	812	329	5	123	467	83	311
Coal	3,946	-	-	-	-	-	-	-	108	-	-
Petroleum	13,295	20,831	18,081	23,348	21,600	15,861	17,316	18,038	18,007	20,157	22,138
Metal & Mfrs.	16	-	4	16	1	15	25	174	559	258	369
Fertilizer	-	-	-	-	32	37	52	166	-	-	212
Fruits	-	-	-	129	-	-	313	261	356	384	794
Paper	57	2	-	7	-	-	146	718	773	909	1,144
Miscellaneous	<u>692</u>	<u>211</u>	<u>42</u>	<u>689</u>	<u>-</u>	<u>3</u>	<u>843</u>	<u>944</u>	<u>1,973</u>	<u>5,425</u>	<u>7,462</u>
Total	166,264	149,864	125,282	177,263	137,971	91,260	136,837	177,018	188,723	197,762	183,977

42. In addition to the commerce landed at Gloucester Harbor, frozen fish blocks and frozen fish products have entered Gloucester by truck from other ports. These products entered this country as part shipments on larger cargo steamers having a draft deeper than would permit safe entry into Gloucester Harbor because of the insufficient channel depths. The minimum and maximum gross tonnage and draft of these vessels carrying partial shipment consigned to Gloucester is as follows:

	<u>Gross Tonnage</u>	<u>Draft</u>
Minimum	972	14'-9"
Maximum	8,276	27'

Local interests believe that, with deeper channels, some of these larger ships would land cargo directly at Gloucester. They assume that a minimum cargo of 1,500 to 2,500 tons could make the landing of larger cargo vessels profitable. Based upon existing and partially complete cold storage facilities, proponents indicate that Gloucester could handle regulated deliveries up to 2,500 tons.

43. Based upon additional terminal facilities scheduled for construction in 1961, the commerce of the Port of Gloucester is expected to increase by approximately 5,300 tons annually. This increase will consist primarily of frozen fish blocks and fish products.

VESSEL TRAFFIC

44. There presently are 262 fishing vessels ranging from 38 feet to 122 feet in length, 6-17 feet in draft and 5 to 259 tons in gross tonnage operating from the Port of Gloucester. These vessels are all documented locally but occasionally land at other ports to discharge their catch. The present value of the Gloucester fishing fleet is \$7,060,000 with a replacement value of \$17,500,000.

45. These documented vessels, at least 5 gross tons and over, are of the dragger, other trawler and seiner type and constitute the "offshore" fleet. Banks fished by these vessels range from Georges Bank, about 160 miles from Gloucester to the Grand Banks and beyond, more than 1,000 miles distant.

46. Thirty vessels documented in other ports operate from the port of Gloucester and land their catches there regularly. They range in length from 35 to 140 feet and in draft from 8 to 17 feet. Their total gross tonnage is 2,824 tons.

47. Approximately 200 more vessels under 5 gross tons, including small type draggers and lobster fishing boats, also operate from the Port of Gloucester.

48. Average trips range from a few hours for the smaller boats to two and three weeks for larger vessels of the "off-shore" fleet. The average length of trip for a registered vessel and the average catch per trip for 1951, 1953 and 1955 is as set forth below.

<u>Year</u>	<u>Average Length of Trip by Registered Vessels</u>	<u>Average Catch per Trip</u>
1951	2.45 days	11.8 tons
1953	1.94 days	8.5 tons
1955	1.96 days	11.6 tons

49. In addition to traffic by vessels of American registry, traffic of foreign vessels having drafts ranging from 8 to 21 feet has increased in recent years. Of a total of 153 vessel trips reported for these craft in the period 1 January - 31 December 1958, approximately 50% were made by vessels with drafts of 16 feet or over.

50. Waterborne commerce statistics for vessel traffic are shown for a ten year period, 1949-1958 in Table II. Trips for foreign registered vessels as reported by local interests for the five year period 1954-1958 are given in Table III. Investigation indicates that trips by foreign registered vessels are included in Table II, but it appears that the drafts shown in Table II are somewhat low.

TABLE II
VESSEL TRAFFIC
GLOUCESTER HARBOR, MASS.

<u>DRAFT</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
20						1				
19										
18		2				3		1		
17	1	14	3				2	2	6	3
16	4	17				20	10	31	35	12
15	375	4,552	47	18	20	22	9,652	8,821	2,757	3,435
14	109	908	99	40	32	55	76	86	84	74
13	158	88	7,990	7,052	11,608	5,888	50	59	41	42
12 & Under	<u>18,493</u>	<u>13,341</u>	<u>23,932</u>	<u>12,845</u>	<u>14,048</u>	<u>8,846</u>	<u>14,538</u>	<u>13,697</u>	<u>10,557</u>	<u>13,954</u>
Total	19,140	18,922	32,071	19,955	25,708	14,835	24,328	22,697	13,480	17,520

TABLE III

ROUND TRIPS BY VESSELS OF FOREIGN REGISTRYGLOUCESTER HARBOR, MASS.

<u>DRAFT</u>	<u>FY 1954</u>	<u>FY 1955</u>	<u>FY 1956</u>	<u>CALENDAR YEAR 1957</u>	<u>CALENDAR YEAR 1958</u>
21	0	0	0	2	0
20	1	0	0	0	0
19	0	0	0	0	0
18	3	9	24	0	0
17	1	7	16	38	34
16	5	32	32	46	41
15	0	0	0	10	18
14	1	1	9	14	26
13	5	7	12	0	0
12	11	12	14	14	19
11	0	3	5	9	12
10	26	24	28	2	2
9	2	6	5	2	1
8	<u>2</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
	57	102	145	137	153

DIFFICULTIES ATTENDING NAVIGATION

51. The approaches to Gloucester Harbor contain many rocks and ledges, some of them unmarked, and careful navigation is necessary especially at night and in thick weather. Although the greater part of the main channel has depths upward of 20 feet, ledge rock, shoaling and underwater obstructions present areas of lesser depth. Frequent instances of vessels grounding in these areas and being forced to wait for a rise in tide in order to be clear have occurred. Strangers are advised not to bring in drafts greater than 18 feet.

52. The width of the harbor between the north side of the Gloucester Fish Pier and the wharves on the opposite shore ranges from about 350 to 400 feet. When vessels are tied up at the fish pier and the wharves opposite there is not sufficient room for vessels leaving the area to turn to head out to sea so that they are forced to back out.

53. A ledge on the northerly side of Harbor Cove is a hazard to navigation and vessels have been damaged in striking it. Fine silt in Harbor Cove is said to work into the engines of fishing vessels with drafts as light as 8 feet when these craft churn water in passage.

54. Three affidavits certifying to touching bottom and grounding were included in the brief submitted in 1956 by the Gloucester Harbor Improvement Committee.

WATER POWER AND OTHER SPECIAL SUBJECTS

55. The waterway under consideration is tidal. There is no problem of water power, flood control, pollution or any related subject. The U.S. Fish and Wildlife Service has reported (see Appendix F) that improvement would have no adverse affect on fish and wildlife.

PLANS OF IMPROVEMENT

56. Plans of improvement of Gloucester Harbor for both moderate draft shipping and for the fishing industry have been considered herein. Consideration was first given to the desires of local interests. For convenience the improvements desired have been divided into several items as indicated below.

a. Item 1. (1) Local interests desire a channel generally 600 feet wide and 22 feet deep into the inner harbor with a large turning basin to provide access to the wharves along the north shore of the harbor. This improvement would require removal of 470,000 cubic yards of ordinary material and hard material requiring drilling and blasting and 50,000 cubic yards of ledge rock at a total cost of approximately \$4,000,000. This total area in addition to not being economically justified is not considered

necessary to meet the needs of navigation and no further consideration to the total area will be given in this report.

(2) A lesser improvement which would provide an entrance channel 300 feet wide, a turning basin, and an access channel of varying widths from 200 feet to 250 feet wide along the northern shore of the inner harbor to depths of 22 feet and 20 feet (included in recommended improvement) has been considered. The desired channel width of 600 feet was reduced to 300 feet and the turning basin was reduced in size on the basis of the size of the vessels transiting the waterway. The location of the turning basin was shifted to deeper water to eliminate the necessity for extensive dredging involving ledge rock removal for which the costs would far exceed the benefits to be received.

(3) The portion of the northern waterfront west of Harbor Cove opposite Fort Point and a small area just east of Harbor Cove, which was included in the desired improvement to a depth of 22 feet, has been considered as Items 6 and 7 respectively, below:

b. Item 2. (1) Local interests desire a channel 16 feet deep to the area south of the Gloucester Fish Pier adjacent to the finger pier wharves and extending to the wharves on the opposite shore. Local interests state that this improvement is necessary to provide access to the wharves and to provide mooring space for vessels using this area.

(2) A lesser improvement which would provide an access channel 200 feet wide to depths of 16 feet and 18 feet with widening at the upper end near the wharves for maneuvering has been considered. This lesser improvement would yield the same benefits in providing access to the wharves as the original desired channel at less cost. Depths in the additional area local interests proposed as mooring space range from 16 feet to 1.4 feet at mean low water and contains about 70,000 cubic yards of material which may include ledge rock. Although it would provide about 5 3/4 acres of anchoring space, there are other areas close by which would provide the same area at a much reduced cost. Therefore no further consideration has been given in this report to dredging full width between the finger piers at Gloucester Fish Pier and the wharves on the south shore.

c. Item 2a. (1) Subsequent to consideration of the improvements under Item 2 local interests advised that new developments would require dredging the channel southeast of the State Fish Pier to a depth of 20 feet, to provide a channel comparable to that on the northwest side of the Fish Pier.

(2) Local interests stated that new developments along the southeast shore of the Inner Harbor will result in an increase in commerce and an increase in the number of trips to Gloucester Harbor by larger draft vessels. Local interests anticipate that vessels unloading cargo at

terminal facilities on the northwest shore of the Inner Harbor will also unload cargo at the facilities on the southeast shore.

(3) Consideration has therefore been given to an improvement for this area which would provide a channel 200 feet wide to depths of 18 and 20 feet (included in recommended improvement) with widening at the upper end near the wharves for maneuvering.

d. Item 3. Local interests desire a channel 22 feet deep into Smith Cove to a point just beyond the facilities of the Out-O-Gloucester Enterprise on Rocky Neck and to the wharves on the opposite shore. This improvement has been considered. In view of the size of the vessels using this area a channel 16 feet deep (included in recommended improvement) has also been considered.

e. Item 4. Local interests desire removal of a ledge shoal opposite the Empire Fish Company's wharf in Harbor Cove. The hydrographic survey shows that this shoal lies within the limits of the berthing space. Since the Federal Government does not participate in dredging private berths, no further consideration has been given to removal of this ledge shoal. However, consideration has been given to improvement in Harbor Cove and is described under Item 5.

f. Item 5. A channel 18 feet deep (included in recommended improvement) or 20 feet deep leading from the main 300-foot channel into Harbor Cove to a point about opposite the United Sea Foods Wharf has been considered.

g. Item 6. A channel 18 feet deep (included in recommended improvement) or 20 feet deep along the northern waterfront west of Harbor Cove adjoining the main 300-foot channel and the channel to Harbor Cove has been considered.

h. Item 7. A 15-foot anchorage of approximately $5\frac{1}{3}$ acres located in the Inner Harbor just east of Harbor Cove has been considered. (Included in the recommended improvement).

i. Item 8. A 16-foot anchorage of approximately 10 acres located in the Inner Harbor opposite Smith Cove has been considered. (Included in recommended improvement).

j. Item 9. Local interests desire the removal of an isolated rock shoal in the Inner Harbor opposite Harbor Cove to a depth of 25 feet. The shoal is a small rock pinnacle, with a high point at a depth of 17 feet in an area 23 to 25 feet deep adjacent to the entrance channel under consideration. Removal to 22 feet would substantially reduce the hazard to navigation but would leave a rock shoal. In view of the small additional cost to completely eliminate the navigation hazard, removal of this rock to 24 feet has also been considered. (Included in recommended improvement).

57. The plan of improvement selected for recommendation provides for an entrance channel 300 feet wide and 20 feet deep with a turning basin; a channel varying in width from 200 to 250 feet and 20 feet deep providing access to the area northwest of the Gloucester Fish Pier; a channel 200 feet wide and 20 feet deep providing access to the area southeast of the Gloucester Fish Pier; an access channel 16 feet deep into Smith Cove; an access channel 18 feet deep along the waterfront west of Harbor Cove and into Harbor Cove; an anchorage 16 feet deep opposite Smith Cove; an anchorage 15 feet deep opposite Harbor Cove; and the removal of ledge from the main channel to a depth of 24 feet.

SHORELINE CHANGES

58. No shoreline change will occur in Gloucester Harbor in connection with the desired improvement.

REQUIRED AIDS TO NAVIGATION

59. The United States Coast Guard has been consulted in regard to establishing aids to navigation for the improvement under consideration. They have reported that an additional 8 buoys would be required to suitably mark the improved channels and anchorages. The estimated first cost of these aids is \$6,400, with increased annual maintenance costs of \$630.

ESTIMATES OF FIRST COST

60. Estimates of first cost have been prepared for the various items of harbor improvement considered in this report. The Federal construction consists of dredging mud, hard clay and gravel and the removal of boulders and ledge to provide the desired channels and anchorages. Aids to navigation will be provided by the U.S. Coast Guard.

61. The estimates of first cost for the individual items of improvement, based on price levels of November 1960 and including an allowance for contingencies, are detailed in Appendix C. The summary of the estimated first cost for the total modification recommended is shown in Table IV below. A summary of the estimates of first cost for each item of improvement considered is shown in Table V.

TABLE IV

ESTIMATED FIRST COST FOR RECOMMENDED IMPROVEMENT

Project Construction CostCorps of Engineers

Dredging ordinary material	\$317,000
Dredging hard material	230,000
Rock removal	460,000
Engineering and design	16,000
Supervision and Administration	<u>77,000</u>
Total Construction Costs	
(November 1960)	\$1,100,000
Preauthorization Study Costs	<u>20,000</u>
Total Corps of Engineers	1,120,000

U.S. Coast Guard

Aids to Navigation	<u>6,000</u>
Total Project Costs (Nov. 1960)	\$1,126,000

TABLE V

ESTIMATED FIRST COSTS OF CONSTRUCTION FOR EACH ITEM CONSIDERED

<u>Item</u>	<u>Channel Depth Considered (in feet)</u>	<u>First Cost of Construction (Incl. Overhead & Cont.)</u>	<u>Navigation Aids</u>	<u>Total</u>
1	22	\$ 984,000	\$3,000	\$ 987,000
	20*	555,000	3,000	558,000
2	18	104,000	1,000	105,000
	16	62,000	1,000	63,000
2a	20*	185,000	1,000	186,000
	18	123,000	1,000	124,000
3	22	207,000	1,000	208,000
	16*	44,000	1,000	45,000
4	Not Estimated			

TABLE V (Cont.)

<u>Item</u>	<u>Channel Depth Considered (in feet)</u>	<u>First Cost of Construction (Incl. Overhead & Cont.)</u>	<u>Navigation Aids</u>	<u>Total</u>
5	20	290,000	1,000	291,000
	18*	155,000	1,000	156,000
6	20	195,000	0	195,000
	18*	75,000	0	75,000
7	15*	0	0	0
8	16*	14,000	0	14,000
9	25	188,000	0	188,000
	24*	92,000	0	92,000

* Recommended

ESTIMATES OF ANNUAL CHARGES

62. The estimated annual charges have been computed on an assumed project life of 50 years with an interest rate of 2.625 percent on Federal investment. Maintenance costs are based on shoaling over various sections of the harbor, determined from actual hydrographic surveys showing differences in depths over a period of 25 years. The estimated annual carrying charges for the various items of improvement considered are detailed in Appendix D. The summary of the estimated annual charges for the recommended total modification is shown in Table VI below. The estimates of annual charges for each item of improvement considered are shown in Table VII.

TABLE VI

ESTIMATED ANNUAL CHARGES FOR RECOMMENDED IMPROVEMENT

InvestmentCorps of Engineers

Construction
Preauthorization Studies

\$1,100,000
20,000

U.S. Coast Guard

Aids to Navigation

Total Investment

6,000
\$1,126,000

Table VI (cont.)

Annual Carrying Charge

Interest (0.02625) (\$1,126,000)	\$29,600
Amortization (0.00989) (\$1,126,000)	11,100
Maintenance	13,700
Maintenance Aids	600
Total Project Annual Charges	<u>\$55,000</u>

TABLE VII

ESTIMATED ANNUAL CHARGES FOR EACH ITEM CONSIDERED

<u>Item</u>	<u>Channel Depth Considered (in feet)</u>	<u>Interest and Amortization</u>	<u>Maintenance</u>		<u>Total</u>
			<u>Dredging</u>	<u>Navigation Aids</u>	
1	22	\$35,500	\$5,200	\$200	\$40,900
	20*	20,200	4,400	200	24,800
2	18	3,700	2,100	200	6,000
	16	2,200	1,600	200	4,000
2a	20*	6,800	3,200	200	10,200
	18	4,400	2,400	200	7,000
3	22	7,500	2,600	100	10,200
	16*	1,600	1,300	100	3,000
4	Not estimated	-	-	-	-
5	20	10,500	2,600	100	13,200
	18*	5,600	1,400	100	7,100
6	20	7,000	2,100	0	9,100
	18*	2,700	1,400	0	4,100
7	15*	0	500	0	500
8	16*	500	1,500	0	2,000
9	25	6,800	0	0	6,800
	24*	3,300	0	0	3,300

* Recommended

ESTIMATES OF BENEFITS

63. The commerce of Gloucester Harbor has been studied to evaluate benefits accruing from deepening and widening the various channels. Studies have been made of the various factors affecting navigation in the harbor to determine the clearance required for safe operation of vessels. The squat of a vessel will vary with its speed. In the approach to the inner harbor it is expected that the vessels will be moving at full speed and the allowance may need to be 2.0 feet. For the areas within the inner harbor where vessels move at reduced speed an allowance of 0.5 foot may be sufficient.

64. The clearance between the vessel keel required due to pitch and roll of the vessel and uneven loading will vary from 0.5 to 1.5 feet. The nature of the material comprising the channel bottom must also be considered. It has been found advisable to allow an extra foot over hard material as compared to soft material. Since the material in Gloucester Harbor consists of mud, hard clay, gravel, boulders and ledge rock this additional foot should be allowed. In addition an allowance of 1 foot is considered reasonable for minus tides, which range to 3.5 feet below mean low water.

65. As a result of all these factors it is considered necessary to allow 4 feet of navigation depth in excess of loaded vessel draft. Thus, for example, a 20-foot channel is considered adequate for the safe operation of a 16-foot draft vessel without tidal delay.

66. The channel described under Item 1 will serve that portion of the fishing fleet using the terminals along the northern shore of the harbor east of Harbor Cove and the terminals located on the north side of the Gloucester Fish Pier. From information on the amount of fish landed, as presented at the public hearing, it is estimated that approximately 55 percent of the domestic vessel traffic for the entire harbor and all of the foreign vessel traffic will use this channel. Based on vessel traffic as reported in 1957 it is estimated that there were over 7,100 vessel trips made by domestic vessels in this section of the harbor, of which over 20 percent of the trips were made by vessels with a draft of 15 feet or greater. A record of foreign vessel trips for 1957 shows 431 trips made of which 299 trips were made by vessels with drafts varying from 12 feet to 21 feet. All these vessels with drafts of 12 feet or greater suffer tidal delays in varying degree due to present harbor depths.

67. The Commonwealth of Massachusetts, realizing that the existing Federal project of 15 feet at mean low water was inadequate for these vessels, has deepened the larger portion of this waterfront channel to 20 feet except where prevented by ledge rock or hard digging requiring blasting. The last dredging by the Commonwealth was completed in 1959. Private berths have been deepened to be commensurate with this channel.

68. The controlling depth over the rock shoals in the channel and at the extreme upper end is 15 feet. The rock shoal is considered a hazard to navigation in addition to causing tidal delays to the vessels transiting the waterway.

69. The estimated annual tidal delay expenses encountered by the domestic fishing boats based on vessel traffic as reported in the 1957 annual report of the Chief of Engineers, and the foreign vessel traffic for 1957 reported by local interests, the estimated annual tidal delay expenses which would occur with each of the channel depths considered, and the resulting benefits from elimination of tidal delays for each channel depth are shown in Table VIII. A detailed analysis of tidal delays and expenses is made in Appendix E.

70. The channel described under Item 2 will serve that portion of the fishing fleet using the terminals on the south side of Gloucester Fish Pier and the terminals on the opposite shore. From information on the amount of fish landed, as presented at the public hearing, it is estimated that approximately 10 percent of the domestic vessel traffic for the entire harbor will use this channel. Based on vessel traffic as reported in the 1957 annual report of the Chief of Engineers it is estimated that there were about 1,300 vessel trips made in this area of which about 44 percent of the trips were made by vessels with drafts ranging from 12 feet to 17 feet. These vessels suffer tidal delays in varying degree due to inadequate harbor depths.

71. There is no Federal project for this section of the harbor. The Commonwealth of Massachusetts has dredged a channel past the wharves on the south shore and to the south side of the Gloucester Fish Pier. The controlling depth in this channel is about 14 feet. The tidal delay expenses and benefits for considered channel depths are shown in Table VIII.

72. The channel described under Item 2a would serve that same portion of the fishing fleet using the terminals on the south side of the State Fish Pier and the terminals on the opposite shore. However, additional traffic in this channel is expected in 1961 after completion of the additional terminal facilities now being constructed by the Quincy Market Cold Storage Warehouse Co. The new terminal is expected to attract a substantial increase in foreign vessel traffic. Vessels in foreign traffic made 431 trips in 1959. Based upon an anticipated increase in foreign commerce of 15,900 tons, it is estimated that 145 vessel trips would be made in the Port of Gloucester when construction of the proposed terminal facilities is completed.

TABLE VIII

ANNUAL TIDAL DELAY EXPENSE IN CHANNELS CONSIDERED
AND BENEFITS FROM IMPROVEMENTS

Improvement	Vessel Trips		Existing Channel	Tidal Delay Expense			
	Domestic	Foreign		Improved Channel Depth (feet)			
				22	20	18	16
1	7176		\$63,730	0	0		
		431	9,560	\$ 50	\$490		
	Total Delay Costs		\$73,290	50	490		
	Net Benefits			\$73,240	\$72,800		
	Incremental Benefit 22'/20' =		440				
2	1305		\$16,820			\$ 2,030	\$ 6,820
	Net Benefits					14,790	10,000
	Incremental Benefit 18'/16' =		4,790				
2a	1305		\$16,820	0	0	2,030	6,820
		145	7,770	0	490	2,190	4,430
			\$24,590		490	\$ 4,220	\$11,250
	Net Benefits			\$24,590	\$24,100	\$20,370	\$13,340
	Incremental Benefit 20'/18' =		\$ 3,730				
3	2000		\$15,000				\$15,000
	Net Benefits						
5	3262		\$17,000		0	\$ 5,070	
	Net Benefits				\$17,000	\$11,930*	
	Incremental Benefit 20'/18' =		\$ 5,070				
6	1305		\$11,820		0	\$ 2,030	
	Net Benefits				\$11,820	\$ 9,790*	
	Incremental Benefit 20'/18' =		\$ 2,030				

* Recommended Improvement

73. As noted in the statistics set forth for Item 2, about 1,300 vessel trips were made in this area by domestic vessels with drafts ranging from 12 feet to 17 feet. These vessels suffer tidal delays in varying degree due to inadequate harbor depths. Since the anticipated foreign vessel traffic will have drafts ranging from 12 feet to 18 feet, these vessels will also suffer tidal delays due to inadequate harbor depths. The tidal delay expenses and benefits for considered channel depths are shown in Table VIII.

74. The channel described under Item 3 will serve that portion of fishing fleet and other craft using the ship repair yard on Rocky Neck at the entrance to Smith Cove and other terminals within this area. Information presented at the public hearing revealed that the shipyard on Rocky Neck and its affiliated yard on the north shore of the inner harbor service an average of 3000 boats per year at both yards. With the exception of two small yacht yards these two yards are the only commercial shipyards in Gloucester Harbor and in the vicinity. On the basis that vessels would be entering light to the shipyard, it is estimated that on an average 1500 vessel trips by craft having a draft of 12 feet are made annually. It is further estimated that another 500 vessel trips will be made to other terminals on this channel by vessels with a draft of 12 feet. Other traffic in this portion of the harbor would be by vessels with a lesser draft for which the existing depths are adequate. Vessels with a 12 foot draft are subject to tidal delays.

75. There is no Federal project for this section of the harbor. The controlling depth is 15 feet. The tidal delay expense and benefits for considered channel depths are shown in Table VIII.

76. No benefits have been evaluated for Item 4.

77. The channel described under Item 5 will service that portion of the fishing fleet using the terminals in Harbor Cove. Information presented at the public hearing indicates that 25 percent of the domestic commerce for Gloucester Harbor is landed at terminals in Harbor Cove. Based on vessel traffic as reported in 1957 it is estimated that over 3200 trips were made of which over 20 percent were made by vessels having a loaded draft ranging from 14 feet to 17 feet.

78. The Commonwealth of Massachusetts, realizing that the existing Federal project of 10 feet at mean low water was inadequate for the larger fishing vessels using the terminals in Harbor Cove, deepened the channel to 19 feet at mean low water. This work was completed in May 1957. Several private berths were dredged at the same time to depths commensurate with the State dredged channel.

79. The controlling depth at the edges of the area dredged by the Commonwealth is about 16 feet and it is expected that the effective controlling depth for the life of the state dredging will be about 16 feet. The tidal delay expense and benefits for considered channel depths are shown in Table VIII.

80. The channel described under Item 6 will serve that portion of the fishing fleet using the terminals on the northern waterfront west of Harbor Cove. Information presented at the public hearing indicates that 10 percent of the domestic commerce for Gloucester Harbor is landed at terminals in this area. Based on vessel traffic as reported in the 1957 annual report of the Chief of Engineers, it is estimated that there were about 1300 vessel trips made by domestic vessels in this section of the harbor, of which nearly 45 percent were made by vessels with drafts ranging from 12 to 17 feet. All of these vessels are subject to tidal delays due to inadequate harbor depths.

81. The existing Federal project for this section of the harbor is 15 feet at mean low water. The controlling depth at the present time is also 15 feet. The tidal delay expense and benefits for considered channel depths are shown in Table VIII.

82. The anchorage described under Item 7 will provide about 5-1/3 acres of anchorage space 15 feet deep that may be utilized by vessels as needed. This area is part of the existing 15-foot Federal project and no dredging is required. This area will provide space for the smaller incoming vessels to await opportunity to unload at existing terminals, provide space to anchor after unloading to avoid congested conditions at the terminals by making room for other vessels to unload or take on supplies, and at times provide anchorage for smaller vessels transiting along the coast that may require shelter from storms.

83. This anchorage area is considered an essential part of a project to improve the harbor. It would result in benefits from savings realized by vessels awaiting clearances to dock because of fog and storm delays as well as boat damages prevented by use of the anchorage for storm refuge. If over the life of the project this anchorage should be credited with saving one vessel valued at \$50,000 from total destruction an annual benefit of \$1,000 would be realized. It is therefore considered that an annual benefit of at least \$1,000 would result from maintenance of this area at the existing project depth.

84. The anchorage described under Item 8, 80 percent of which has depths of 16 feet or greater now and which requires only a small amount of dredging on the east side, would provide 10 acres of protected anchorage space in the inner harbor. This area would provide space outside of the designated access channels for incoming vessels to await opportunity to unload at existing terminals, provide space to anchor after unloading to avoid congested conditions at the terminals thus making room for other vessels to unload or take on supplies and at times it provides anchorage for vessels transiting along the coast that may require shelter from storms.

85. This anchorage area is also considered an essential part of a project to improve the harbor. It would result in benefits from savings realized by vessels awaiting clearances to dock because of fog and storm

delays as well as damage prevented by use of the anchorage for refuge from storms. If, over the life of the project, this anchorage should be credited with saving one vessel valued at \$150,000 from total destruction an annual benefit of \$3,000 would be realized. It is therefore considered that an annual benefit of at least \$3,000 would result from maintenance of this anchorage.

86. Removal of the isolated rock shoal described under Item 9 will eliminate a navigational hazard. Vessel operators and local interests report that this isolated rock shoal has been struck several times by the larger vessels entering the harbor. Affidavits of groundings on obstructions in the harbor from masters of foreign registered vessels landing cargo were presented at the public hearing. A representative of two of the larger commercial shipyards in Gloucester Harbor stated that in a 120-day period previous to the hearing, 4 vessels were in the shipyard for repair because of grounding out in the channel area of the harbor. The total cost to the owners amounted to about \$14,000 for repairs to these four vessels. Based on this rate, damage to vessels from grounding would amount to over \$50,000 a year.

87. Since the public hearing in 1956, expansion of berthing, wharfage and storage space at the larger cold storage and processing plants has been accomplished to provide for more imported frozen fish products from Iceland, Greenland, Norway, Denmark and other foreign countries. It is anticipated that the trend toward larger vessels of deeper draft may follow in transporting the imports as well as returning with part or full cargoes of exports. Damage to these vessels if grounded on this isolated rock shoal could run considerably higher than that which has been reported.

88. Vessels enter the harbor during fog and at night. The isolated rock shoal with a present depth of about 17 feet is in an area that is 23 to 25 feet deep, and although marked by a buoy is a hazard to navigation. The long time annual average of damages resulting from striking this rock shoal is estimated at \$10,000. Elimination of this hazard would result in elimination of this damage, therefore the benefit accruing to the improvement by removing this isolated rock shoal to a depth of either 24 feet or 25 feet is therefore taken to be \$10,000 annually.

COMPARISON OF BENEFITS AND COSTS

89. The total investment, annual costs, annual benefits, and benefit-cost ratios for each of the items considered are shown in Table IX.

TABLE IX

SUMMARY OF INVESTMENTS, ANNUAL CHARGES, BENEFITS AND
BENEFIT-COST RATIOS FOR CONSIDERED IMPROVEMENTS

<u>Item</u>	<u>Channel Depth Considered</u>	<u>Invest- ment cost</u>	<u>Annual Charges</u>	<u>Annual Benefits</u>	<u>Benefit Cost Ratio</u>	<u>Remarks</u>
1	22' *20'	\$987,000 558,000	\$ 40,900 24,800 (16,100)	\$ 73,200 72,800 (400)	1.8 2.9* 0.0	From entrance to N of Fish Pier
2	18' 16'	105,000 63,000	6,000 4,000 (2,000)	14,800 10,000 (4,800)	2.5 2.5 2.4	150' wide S of Fish Pier
2a	*20' 18'	186,000 124,000	10,200 7,000 (3,200)	24,100 20,400 (3,700)	2.4* 2.9 1.2	200' wide S of Fish Pier
3	22' *16'	208,000 45,000	10,200 3,000 (7,200)	15,000 15,000 (0)	1.5 5.0* 0.0	Smith Cove
4	Not Estimated		-	-	-	Ledge in berth area
5	20' *18'	291,000 156,000	13,200 7,100 (6,100)	17,000 11,900 (5,100)	1.3 1.7* 0.8	Harbor Cove
6	20' *18'	195,000 75,000	9,100 4,100 (5,000)	11,800 9,800 (2,000)	1.3 2.4* 0.4	S of Harbor Cove
7	*15'	0	500	1,000	2.0*	Anchorage E of Harbor Cove
8	*16'	14,000	2,000	3,000	1.5*	Anchorage opposite Smith Cove
9	25' *24'	188,000 92,000	6,800 3,300 (3,500)	10,000 10,000 (0)	1.5 3.0* 0.0	Isolated Rock Shoal
* Total						
Project		\$1,126,000	\$55,000	\$147,600	2.7*	Sum of Recommended Items

90. A comparison from Table IX of annual benefits and annual costs for Item 1, shows that a channel 22 feet deep at mean low water would have an annual cost of \$40,900 and would provide annual benefits of \$73,200 resulting in a benefit cost ratio of 1.8 to 1. The same channel dredged to 20 feet at mean low water would have an annual cost of \$24,800 against annual benefits of \$72,800 resulting in a benefit-cost ratio of 2.9 to 1. The incremental benefit resulting from deepening from 20 feet to 22 feet against the incremental cost results in a benefit-cost ratio of 0.0 to 1.

91. Local interests, in support of the 22-foot channel claimed a large amount of imported frozen fish products has entered Gloucester by truck from ports of New York, Boston and Providence. These imports have originated principally in Greenland, Norway, Denmark and England and enter this country on larger cargo steamers having a draft deeper than would permit safe entry into Gloucester Harbor because of insufficient channel depths. It is noted that these larger cargo vessels berth at deep water ports with channel depths of 35 feet or greater and it is doubtful whether the deepening from 20 feet to 22 feet would be sufficient to encourage these vessels to berth at Gloucester. The average tidal delay of a ship that can safely navigate a 22-foot channel over a ship that can safely navigate a 20-foot channel is less than 1 hour. Fifteen loaded trips of one million pounds each would probably more than equal the amount of fish trucked from New York, Boston and Providence, and would result in less than \$1,000 annually in tidal delay expense. An increase of at least \$12,000 annually would be required to justify a 22-foot channel in Gloucester Harbor.

92. From the above it is concluded that a 22-foot channel for Item 1 is not justified at this time. However, a channel 20 feet deep at mean low water is justified having a benefit-cost ratio of 2.9 to 1.

93. A comparison from Table IX of annual benefits and annual costs for Item 2, shows that a channel 16 feet at mean low water would have an annual cost of \$4,000 and would provide annual benefits of \$10,000 resulting in a benefit-cost ratio of 2.5. The same channel dredged to 18 feet at mean low water would have an annual cost of \$6,000 against annual benefits of \$14,800 resulting in a benefit-cost ratio of 2.5 to 1. The incremental benefit resulting from deepening from 16 feet to 18 feet against the incremental costs results in a benefit-cost ratio of 2.4. The operation of the larger fishing vessels in the 16-foot channel present a hazard of grounding out whereas in the 18-foot channel this hazard is greatly reduced. It is considered with the evaluated incremental benefit-cost ratio of 2.4 to 1 that construction of the 18-foot channel over the 16-foot channel is justified. The construction of a channel with a depth greater than 18 feet is not justified at this time for the present vessel traffic.

94. It is expected that additional traffic in the channel considered under Item 2 will result after completion of the new storage terminal on the south side of the harbor. This future foreign vessel traffic has been considered under Item 2a.

95. A comparison from Table IX of annual benefits and annual costs for Item 2a shows that a channel 18 feet deep at mean low water would have an annual cost of \$7,000 and would provide annual benefits of \$20,400 resulting in a benefit-cost ratio of 2.9 to 1. The same channel dredged to 20 feet at mean low water, as desired by local interests, would have an annual cost of \$10,200 and would provide annual benefits of \$24,100 resulting in a benefit-cost ratio of 2.4 to 1. The incremental benefit resulting from deepening the channel from 18 feet to 20 feet against the incremental costs results in a benefit-cost ratio of 1.2 to 1.

96. Of the 145 projected trips by foreign vessels, 102 will be made by vessels having a draft of 16 feet or greater. An anticipated 58 trips will be made by vessels having a draft of 17 feet or greater. Of the 1300 trips made by domestic craft, 271 were made by vessels having a draft of 15 feet or greater. A further breakdown of foreign and domestic shipping indicates that 365 vessel trips will be made by boats having a draft of 15 and 16 feet. In consideration of the required 4 feet of navigation depth in excess of loaded draft in Gloucester Harbor all vessels with a draft of 15 feet or greater will be subjected to tidal delay in navigating a channel 18 feet deep. Since safe navigation will be dependent upon a sufficient increase in tidal depth, an 18 foot channel presents the possibility of grounding out by deeper draft vessels. Deepening of the channel to 20 feet will eliminate all possibility of a grounding accident and will also eliminate all tidal delay for these vessels.

97. Based upon the elimination of a navigation hazard and of tidal delay expense for the additional traffic to the new terminal and based upon the evaluated incremental benefit-cost ratio of 1.2 to 1, it is considered that construction of the 20 foot channel is justified.

98. A comparison from Table IX of annual benefits and annual costs for Item 3, shows that a channel 22 feet deep at mean low water, as desired by local interests, would have an annual cost of \$10,200 and would provide annual benefits of \$15,000 resulting in a benefit-cost ratio of 1.5 to 1. The same channel dredged to 16 feet at mean low water would have an annual cost of \$3,000 and would provide the same annual benefit of \$15,000 resulting in a benefit-cost ratio of 5.0 to 1. There are no incremental benefits to be obtained by deepening this channel greater than 16 feet and therefore providing a channel of a greater depth is not justified.

99. A comparison from Table IX of annual benefits and annual costs for Item 5, shows that a channel 18 feet deep at mean low water would have an annual cost of \$7,100 and would provide annual benefits of \$11,900 resulting in a benefit-cost ratio of 1.7 to 1. The same channel dredged to 20 feet at mean low water would have an annual cost of \$13,200 and would provide annual benefits of \$17,000 resulting in a benefit-cost ratio of 1.3 to 1. The incremental benefit resulting from deepening from 18 feet to 20 feet against the incremental cost results in a benefit-cost ratio of 0.8 to 1.

100. The above benefits resulting from a channel 20 feet deep would only be realized provided local interests deepened the berths of their terminals and made necessary wharf improvements to strengthen the wharves to withstand the additional deepening of the berths. This work is estimated to cost \$50,000 and is considered self-liquidating. In view of the high costs that would have to be spent by local interests for wharf and berth improvements for the channel 20 feet deep, and since the incremental benefit-cost ratio of 0.8 to 1 is unfavorable, the provision of a channel deeper than 18 feet at mean low water is not justified at this time. A channel 18 feet deep has a benefit-cost ratio of 1.7 to 1 and is justified.

101. A comparison from Table IX of annual benefits and annual costs for Item 6, shows that a channel 18 feet deep at mean low water would have an annual cost of \$4,100 and would provide annual benefits of \$9,800 resulting in a benefit-cost ratio of 2.4 to 1. The same channel dredged to 20 feet would have an annual cost of \$9,100 against annual benefits of \$11,800 resulting in a benefit-cost ratio of 1.3 to 1. The incremental benefit resulting from deepening from 18 feet to 20 feet against the incremental cost results in a benefit-cost ratio of 0.4 to 1. Therefore dredging to a depth greater than 18 feet at mean low water is not justified. A channel 18 feet deep at mean low water is justified having a benefit-cost ratio of 2.4 to 1.

102. A comparison from Table IX of annual benefits and annual costs for Item 7 shows that maintenance of an anchorage area of 5 1/3 acres at a depth of 15 feet would have an annual cost of \$500 and would provide annual benefits of \$1,000 resulting in a favorable benefit-cost ratio of 2.0 to 1.

103. A similar comparison for Item 8 shows that the provision of an anchorage area of 10 acres at a depth of 16 feet would have an annual cost of \$2,000 and would provide annual benefits of \$3,000 resulting in a favorable benefit-cost ratio of 1.5 to 1.

104. A comparison from Table IX of annual benefits and annual costs for Item 9, shows that removal of the isolated rock shoal to a depth of 24 feet at mean low water would have an annual cost of \$3,300

and would provide annual benefits of \$10,000 resulting in a benefit-cost ratio of 3.0 to 1. Removing this shoal to a depth of 25 feet would have annual costs of \$6,800 against annual benefits of \$10,000, resulting in a benefit-cost ratio of 1.5 to 1. There would be no incremental benefits for deepening from 24 feet to 25 feet. It is therefore concluded that removal of the shoal to 25 feet is not justified. Removal of this rock shoal to a depth of 24 feet is justified.

105. The recommended modification of the Federal project for Gloucester Harbor consists of the sum of the various items that are justified above. The total project would cost \$1,126,000 and have annual costs of \$55,000 and annual benefits of \$147,600. The benefit-cost ratio for the total modification is 2.7 to 1.

PROPOSED LOCAL COOPERATION

106. Construction of the improvements considered in this report will require shore access for contractor's equipment and range markers. In view of the material to be removed, which will require use of a bucket or dipper dredge, and the lack of suitable spoil disposal areas within economic distances from the work areas it is considered that spoil disposal areas would not be required. Local interests should be required to provide without cost to the United States all lands, easements, and rights-of-way required for construction of the project, and for construction and maintenance of aids to navigation, upon the request of the Chief of Engineers. Local interests should further be required to hold and save the United States free from damages due to the construction works.

107. Local interests have provided the necessary terminal facilities to insure use of the Federal improvement. With the exception of the new facility on the south shore of the harbor, the present terminals are adequate and have berths that are commensurate with the channel depths under consideration. The Quincy Market Cold Storage and Warehouse, East Gloucester terminal, now under construction, will have a wharf 600 feet long with a berth 20 feet deep which will be adequate for the traffic expected. Local interests should be required to maintain adequate berths at terminal facilities.

108. It is not expected that the indicated requirements of local cooperation would involve any direct or additional cost to local interests. In view of past and continuing improvements to Gloucester Harbor by the Commonwealth of Massachusetts and local interests it is further considered that the proposed requirements would be met. The Gloucester City Council voted 22 July 1960 to meet the requirements for Federal improvement.

APPORTIONMENT OF COSTS AMONG INTERESTS

109. As the benefits from the improvement would accrue to commercial navigation, project costs have been computed on the basis that the cost of the improvement will be entirely borne by the United States. All costs for dredging and rock removal, and for maintenance of the navigation channels have therefore been allocated to the Corps of Engineers. Costs for required navigation aids are allocated to the U.S. Coast Guard.

COORDINATION WITH OTHER AGENCIES

110. All Federal, State and local agencies known to have an interest in the development and use of waterways were notified of the public hearing held in Gloucester, Massachusetts on November 7, 1956. Officials of the Massachusetts Division of Fisheries and Game, Massachusetts Division of Marine Fisheries, the Massachusetts Department of Public Works, officials of the City of Gloucester and pleasure and fishing boat interests were consulted during the study concerning the effects of the proposed improvement on their activities. Officials of the Commonwealth and of the City of Gloucester have expressed approval of the proposed improvements.

111. The United States Coast Guard was advised of the improvement under consideration and was requested to comment on aspects pertaining to their interests. By letter of 15 July 1960 the Commander of the First Coast Guard District replied that an additional 8 new buoys would be required to suitably mark the improved channels and anchorage.

112. The regional office of the United States Fish and Wildlife Service was also requested to comment on the plan of improvement. Their report (See Appendix F) indicated that there would be no adverse effects on fish and wildlife or any benefit to commercial fishermen. The improvement would benefit the larger commercial vessel traffic.

113. The Division of Fisheries and Game and the Division of Marine Fisheries of the Commonwealth of Massachusetts have indicated that the proposed improvement to Gloucester will have no adverse effect on fish and wildlife in the area.

DISCUSSION

114. Gloucester Harbor is located at the southern extremity of Cape Ann about 25 miles northeast by water from Boston Harbor. It consists of an outer harbor, approximately 1,000 acres in area, and an inner harbor approximately 52 acres in area. Gloucester's commerce is conducted in the inner harbor.

115. The area immediately tributary to Gloucester Harbor is the City of Gloucester, located on Cape Ann in Essex County, Massachusetts. The principal industries of the area are fishing, fish imports from foreign countries, extensive boatyard and marine railway activity and manufacturing. This is also a well developed recreational area with many hotels and some excellent beaches.

116. The history of Federal improvement of Gloucester Harbor dates back to 1872. The existing project was first authorized by a River and Harbor Act of August 11, 1888 and further improvements were authorized by subsequent acts.

117. Gloucester Harbor also has a history of improvement by the City of Gloucester and the Commonwealth of Massachusetts. These interests have expended in excess of \$2,000,000 for harbor improvements. Continued interest in the improvement of Gloucester Harbor is evidenced by the recent passing of a bill by the Massachusetts House of Representatives calling for dredging a portion of Gloucester Harbor at a cost up to \$500,000. The bill, now submitted for Senate approval, will authorize dredging an approach channel, mooring basin and turn-around area to serve the southeast portion of the State Fish Pier in Gloucester Harbor.

118. Gloucester Harbor has approximately 75 piers and wharves of which 2 are owned by the city and one owned by the Commonwealth and leased to local interests. Approximately 90% of these wharves are used in connection with the fishing industry.

119. Fish and fish products constitute approximately 80% of the existing commerce of the harbor. Petroleum products constitute approximately 12% of the commerce and the remainder is variously divided among meat and animal products, fruits, vegetables, machinery and manufactured products. Statistics indicate that water-borne commerce has averaged 156,600 tons annually in combined shipments and receipts in the last ten years. Statistics also indicate a gradual increase in foreign import tonnage and a substantial increase in foreign export tonnage. Foreign exports have increased from 3896 tons in 1956 to 10,006 tons in 1958. Recent local developments and the construction of new terminal facilities will provide for and attract additional commerce, consequently, it is reasonable to assume that the import-export tonnage of the harbor will continue to increase substantially.

120. Local interests have requested the following improvements to the harbor.

a. Dredging the main channel and the channel along the northerly side of the State Fish Pier to a depth of 22 feet and a width of 600 feet.

b. Removal of ledge marked by buoy N-20 in the main channel and removal of ledge opposite the Empire Fish Company in Harbor Cove.

c. Dredging to a depth of 20 feet the area southerly of the State Fish Pier.

d. Dredging to a depth of 22 feet, a turning basin approximately 350 yards square between Buoy N-14 and Buoy N-20.

121. Studies accomplished in connection with preparation of this report indicated that a substantial amount of shipping causes tidal delay expense due to present harbor conditions and that the existing conditions also constitute hazards to navigation. Studies also indicated that the cost of the improvement initially requested by local interests was about \$4,500,000 and exceeded the potential benefits which might accrue to such improvement. Consideration was therefore given to a lesser improvement which would serve the same purpose. The lesser improvement provides for an entrance channel 300 feet wide and 20 feet deep with a turning basin; a channel varying in width from 200 to 250 feet and 20 feet deep providing access to the area northwest of the Gloucester Fish Pier; a channel 200 feet wide and 20 feet deep providing access to the area southeast of the Gloucester Fish Pier; an access channel 16 feet deep into Smith Cove; an access channel 18 feet deep along the waterfront west of Harbor Cove and into Harbor Cove; an anchorage 16 feet deep opposite Smith Cove; an anchorage 15 feet deep opposite Harbor Cove; and the removal of a rock shoal adjacent to the main channel to a depth of 24 feet. A hydrographic survey indicated that the ledge shoal opposite the Empire Fish Company in Harbor Cove was located within the limits of the berthing space, and no further consideration was given to that improvement feature.

122. Local interests have expressed satisfaction with the lesser improvement and have indicated that it would meet their needs. The estimated cost of the lesser improvement is \$1,100,000. Since the benefits from the improvement would accrue to commercial navigation, annual charges have been computed on the basis that the cost of the improvement will be entirely borne by the United States.

CONCLUSIONS

123. The general navigation facilities at Gloucester Harbor are inadequate for the present needs for commercial shipping and commerce. Improvements are needed to provide:

- a. Adequate channels to reduce tidal delays for vessels having a draft of 11 feet or greater.
- b. Safe clearances over ledge areas and rock shoals that are hazards to navigation.
- c. Anchorage space for vessels not actually loading or unloading to eliminate congested conditions at terminals.
- d. Anchorage space for smaller vessels that require shelter from storms.

124. The benefit-cost ratio of the individual items of improvement varies from 1.5 to 1 to 5.0 to 1. The benefit-cost ratio of the total project modification is 2.7 to 1 indicating that a Federal improvement is economically justified. In view of the nature of the work needed and the benefits therefrom modification of the Federal project is considered warranted.

125. Local interests should be required to relieve the United States from claims for damages which might arise from construction of the improvement, should provide to the United States all lands, easements and rights-of-way necessary for construction and maintenance of the project and navigation aids, and maintain adequate berths at terminal facilities. It is considered that these requirements would not involve any direct cost.

126. The first cost to be borne by the United States is \$1,100,000 exclusive of \$20,000 expended for preauthorization studies and \$6,000 estimated for additional aids to navigation, or a total estimated Federal cost of \$1,126,000 (November 1960). In the event the project is authorized funds for the improvement should be appropriated in two consecutive fiscal years to assure economical prosecution of the work.

127. State and local officials have been consulted regarding the proposed improvement and have expressed approval of the plan and indicated that the requirements of local cooperation will be provided when required.

128. The U.S. Fish and Wildlife Service, the Division of Fisheries and Game, and the Division of Marine Fisheries of the Commonwealth of Massachusetts have indicated that they anticipate no adverse effects on fish or wildlife due to the proposed improvement of Gloucester Harbor.

RECOMMENDATION

129. It is recommended that the existing Federal navigation project for Gloucester Harbor and Annisquam River, Massachusetts, be modified as shown on the inclosed map to provide:

- a. An entrance channel into the Inner Harbor 300 feet wide and 20 feet deep with a turning basin 600 feet wide.
- b. An access channel 200 to 250 feet wide and 20 feet deep along the waterfront to the northwest of the Gloucester Fish Pier.
- c. An access channel 200 feet wide and 20 feet deep along the waterfront to the southeast of the Gloucester Fish Pier.
- d. An access channel varying from 650 to 300 feet wide and 16 feet deep extending into Smith Cove.

e. An access channel varying from 500 to 100 feet wide and 18 feet deep, along the water front west of Harbor Cove and into Harbor Cove.

f. An anchorage of about 5 acres 15 feet deep east of the entrance to Harbor Cove.

g. An anchorage of about 10 acres 16 feet deep opposite the entrance to Smith Cove.

h. Removal of the isolated rock shoal adjacent to the entrance channel south of Harbor Cove to a depth of 24 feet.

130. The estimated construction cost for this modification is (November 1960) \$1,100,000 for new work with \$13,700 annually for maintenance.

131. This improvement is recommended subject to the condition that prior to construction local interests assure that they will:

a. Provide without cost to the United States all lands, easements, and rights-of-way required for construction of the project, and for construction and maintenance of aids to navigation, upon the request of the Chief of Engineers.

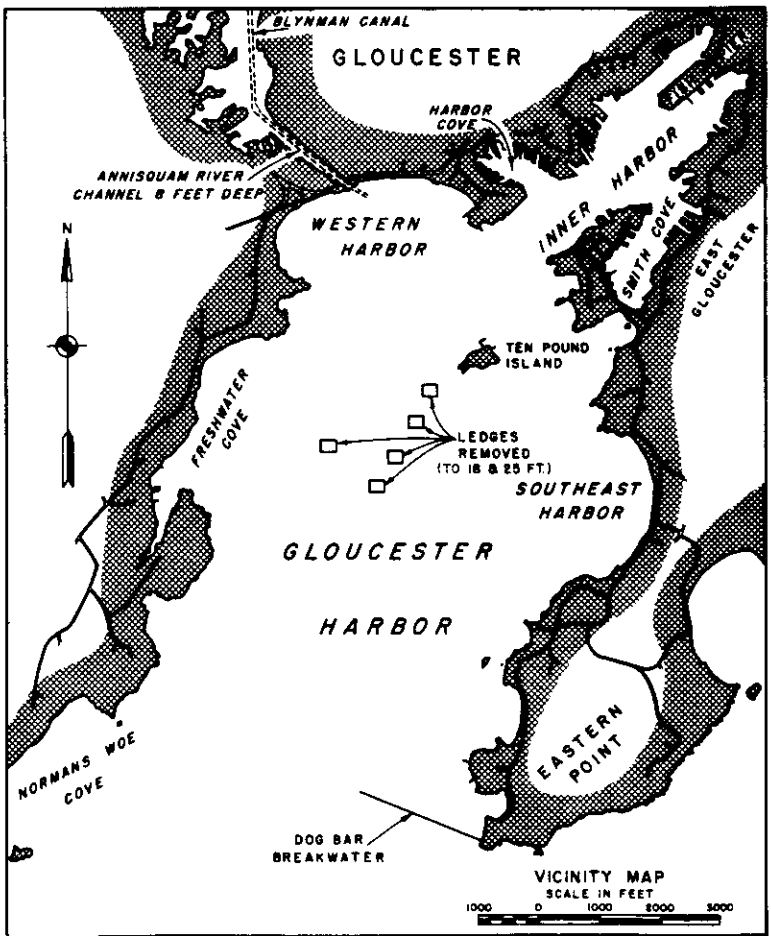
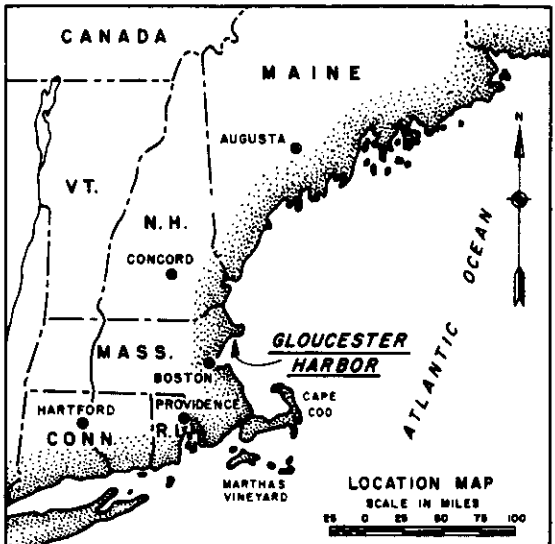
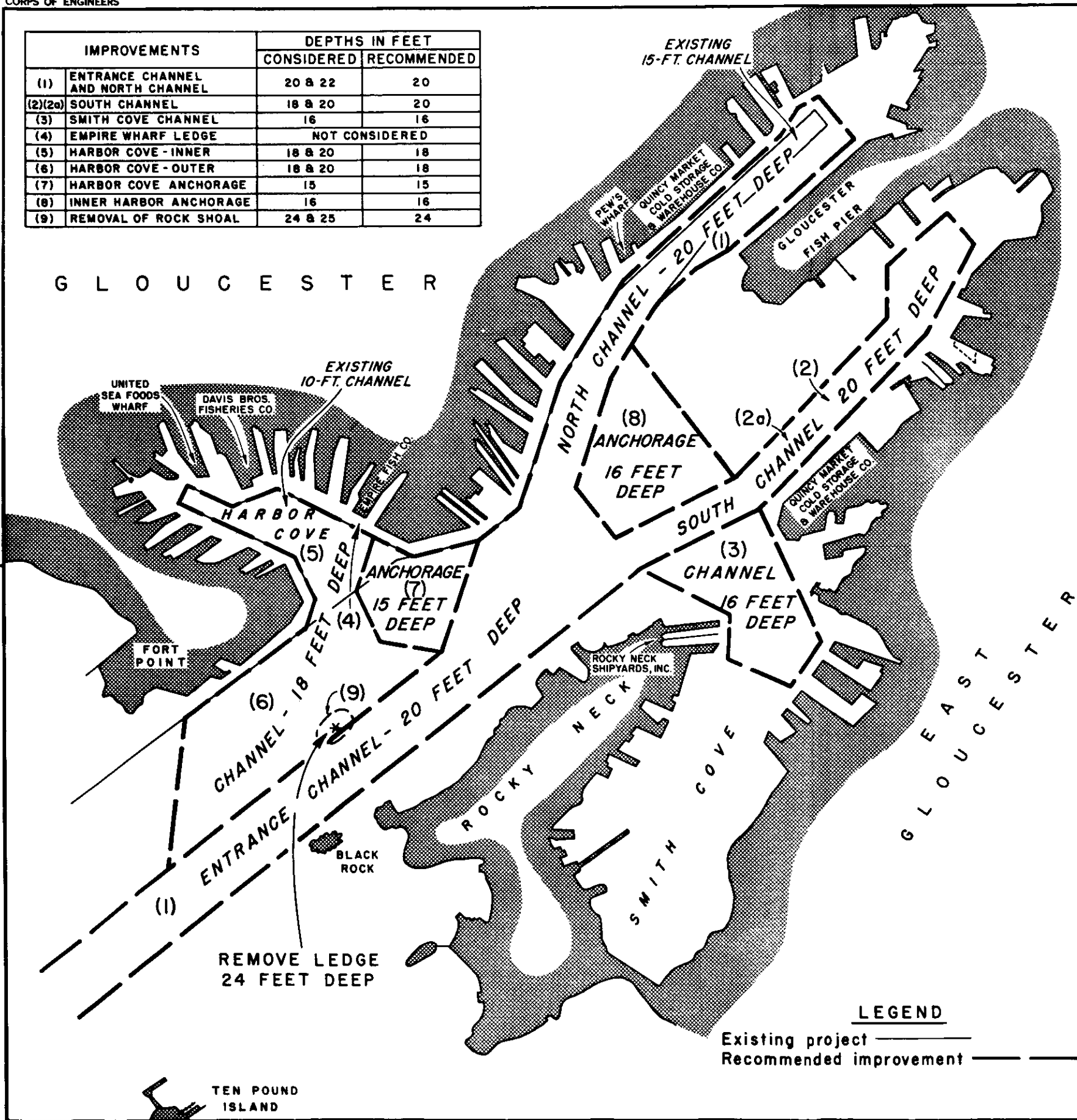
b. Hold and save the United States free from damages due to the construction works;

c. Maintain without cost to the United States depths in berthing areas commensurate with the depths provided in the related project areas;

and provided further that, if it is determined in detailed studies that spoil disposal areas are needed, local interests agree to furnish, upon request of the Chief of Engineers, and without cost to the United States, any such areas required including such dikes, bulkheads and embankments as may be necessary for the initial dredging and subsequent maintenance.

SEYMOUR A. POTTER, JR.
Brigadier General, U.S. Army
Division Engineer

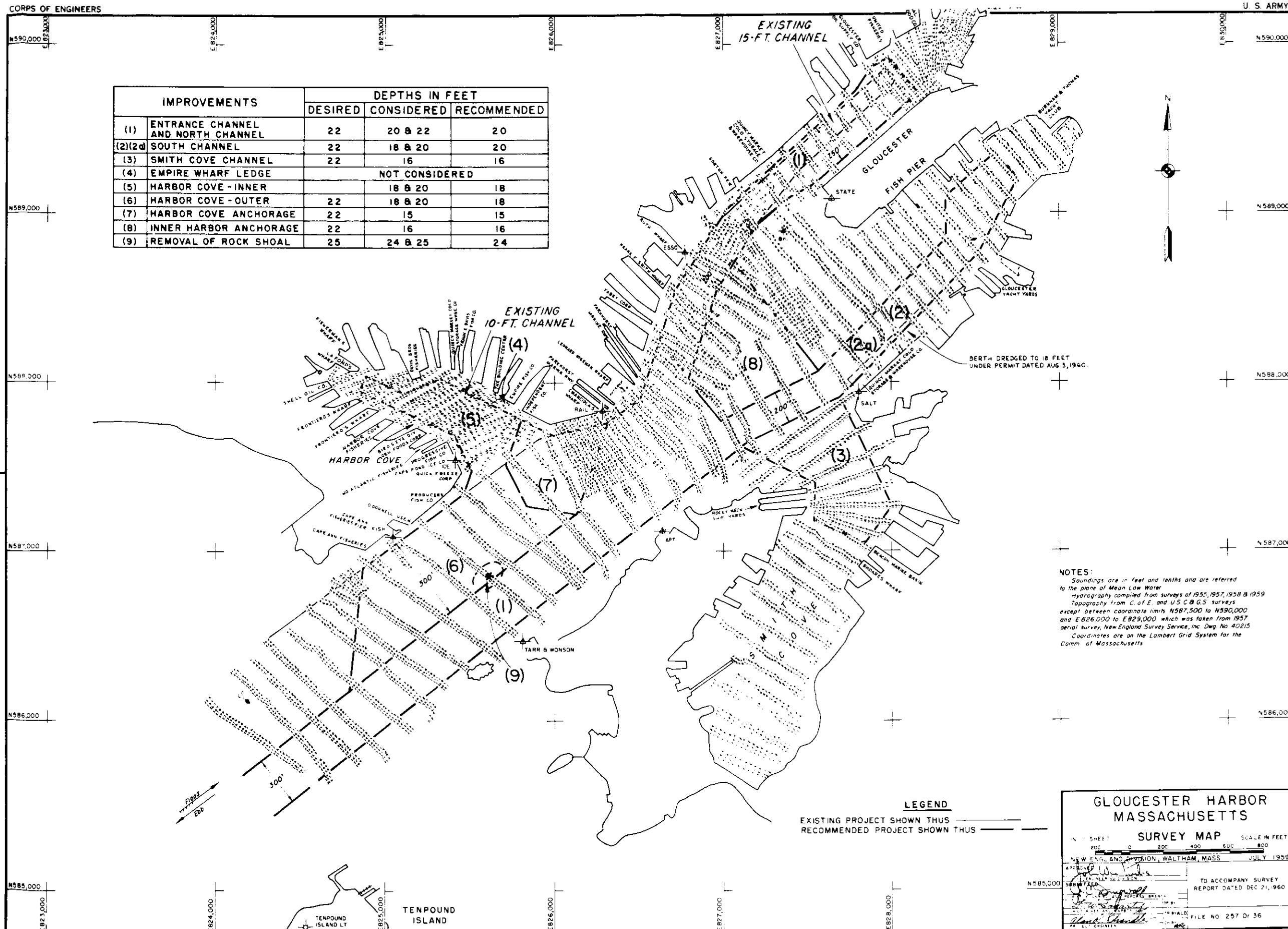
IMPROVEMENTS		DEPTHS IN FEET	
		CONSIDERED	RECOMMENDED
(1)	ENTRANCE CHANNEL AND NORTH CHANNEL	20 & 22	20
(2)(2a)	SOUTH CHANNEL	18 & 20	20
(3)	SMITH COVE CHANNEL	16	16
(4)	EMPIRE WHARF LEDGE	NOT CONSIDERED	
(5)	HARBOR COVE - INNER	18 & 20	18
(6)	HARBOR COVE - OUTER	18 & 20	18
(7)	HARBOR COVE ANCHORAGE	15	15
(8)	INNER HARBOR ANCHORAGE	16	16
(9)	REMOVAL OF ROCK SHOAL	24 & 25	24



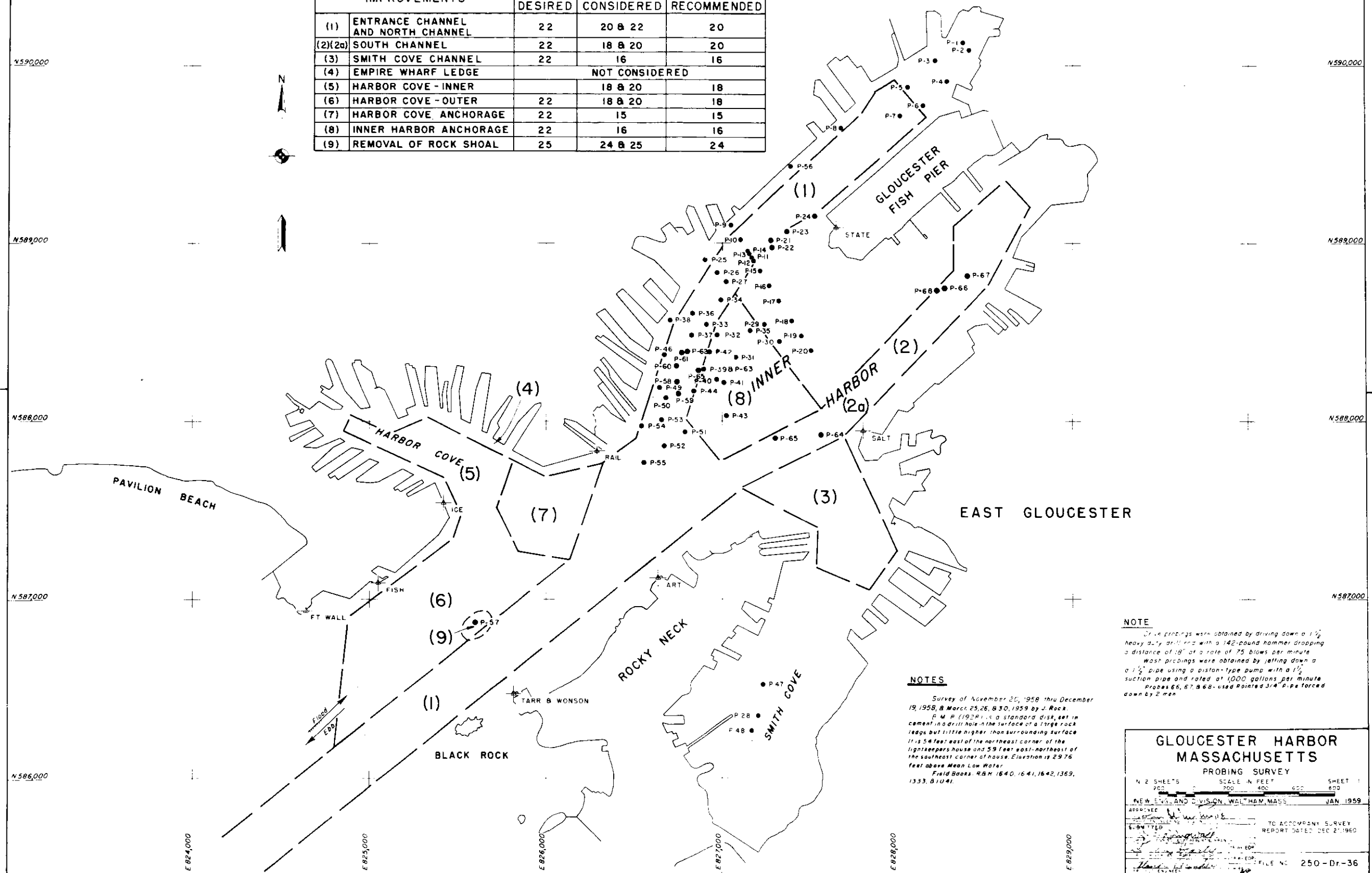
LEGEND
Existing project ———
Recommended improvement ———

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS, WALTHAM, MASS.	
GLOUCESTER HARBOR, MASS. INNER HARBOR	
SCALE IN FEET 0 200 400 600 800	
APPROVED <i>[Signature]</i> ENGINEER	TO ACCOMPANY SURVEY REPORT DATED DEC. 21, 1960
CHECKED <i>[Signature]</i> ENGINEER	FILE NO. 261 Df. 36
DESIGNED <i>[Signature]</i> ENGINEER	
CONSTRUCTED <i>[Signature]</i> ENGINEER	
MAINTAINED <i>[Signature]</i> ENGINEER	
PROJECT ENGINEER	

IMPROVEMENTS	DEPTHS IN FEET		
	DESIRED	CONSIDERED	RECOMMENDED
(1) ENTRANCE CHANNEL AND NORTH CHANNEL	22	20 & 22	20
(2)(2a) SOUTH CHANNEL	22	18 & 20	20
(3) SMITH COVE CHANNEL	22	16	16
(4) EMPIRE WHARF LEDGE	NOT CONSIDERED		
(5) HARBOR COVE - INNER		18 & 20	18
(6) HARBOR COVE - OUTER	22	18 & 20	18
(7) HARBOR COVE ANCHORAGE	22	15	15
(8) INNER HARBOR ANCHORAGE	22	16	16
(9) REMOVAL OF ROCK SHOAL	25	24 & 25	24



IMPROVEMENTS		DEPTHS IN FEET		
		DESIRED	CONSIDERED	RECOMMENDED
(1)	ENTRANCE CHANNEL AND NORTH CHANNEL	22	20 & 22	20
(2)(2a)	SOUTH CHANNEL	22	18 & 20	20
(3)	SMITH COVE CHANNEL	22	16	16
(4)	EMPIRE WHARF LEDGE	NOT CONSIDERED		
(5)	HARBOR COVE - INNER		18 & 20	18
(6)	HARBOR COVE - OUTER	22	18 & 20	18
(7)	HARBOR COVE ANCHORAGE	22	15	15
(8)	INNER HARBOR ANCHORAGE	22	16	16
(9)	REMOVAL OF ROCK SHOAL	25	24 & 25	24



NOTES

Survey of November 20, 1958 thru December 19, 1958, & March 25, 26, & 30, 1959 by J. Rock.
P.W.P. (1958) is a standard disk, set in cement in a drill hole in the surface of a large rock ledge but little higher than surrounding surface. It is 54 feet east of the northeast corner of the lightkeepers house and 59 feet east-northeast of the southeast corner of house. Elevation is 29.76 feet above Mean Low Water.
Field Books: R.B.M. 1640, 1641, 1642, 1369, 1333, 81041.

NOTE

Drive readings were obtained by driving down a 1 1/2 inch heavy duty drill rod with a 142-pound hammer dropping a distance of 18" at a rate of 75 blows per minute. Most readings were obtained by letting down a 1 1/2 inch pipe using a piston-type pump with a 1 1/2 inch suction pipe and rated at 1000 gallons per minute. Probes 66, 67, & 68 - used Pointed 3/4" pipe forced down by 2 men.

GLOUCESTER HARBOR MASSACHUSETTS PROBING SURVEY			
N 2 SHEETS	SCALE IN FEET	SHEET 1	
200	200 400 600 800		
NEW ENGLAND DIVISION, WALTHAM, MASS. JAN. 1959			
APPROVED	TO ACCOMPANY SURVEY REPORT DATED DEC 2, 1958		
FILE NO. 250-Dr-36			

LIST OF PROBINGS					
NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W.		PENETRATION	MATERIAL
		DEPTH OF PROBE	BLOW COUNT		
1	7.1	128	57		Soft Mud
		20	90		Hard Clay
		02	20		Hard Clay
		08	49		Hard Clay
		08	70		Hard Clay
		20	65		Hard Clay
		09	60		Hard Clay
		195	100		Refusal
2	7.4	117	43		Soft Mud
		126	09	66	Hard Clay
		137	1.7	120	Hard Clay
		161	2.4	100	Hard Clay
		167	06	100	Hard Clay
		187	20	120	Hard Clay
		197	10	100	Hard Clay
		204	07	100	Hard Clay
		215	1.1	100	Hard Clay
		228	1.3	100	Hard Clay
		237	09	100	Hard Clay
		248	1.1	100	Hard Clay
		254	06	128	Hard Clay
3	14.6	173	27		Soft Mud
		201	28	154	Hard Clay
		245	4.1	126	Hard Clay
		253	1.1	66	Hard Clay
4	8.4	137	53		Soft Mud
		154	1.7	20	Soft Clay
		177	23	53	Soft Clay
		206	29	325	Hard Clay
		236	30	305	Hard Clay
		251	15	174	Hard Clay
5	14.2	190	48		Soft Mud
		230	40	261	Soft Clay
		251	2.1	153	Soft Clay
6	21.6	259	43		Soft Mud
7	22.4	252	26		Soft Clay & Sand
8	14.9	272	123		Washed Probing
					Soft Mud & Sand
					(Piston type pump rated at 1000 gals per hr.)
9	18.4	260	84		Washed Probing
					Soft Mud to Clay
					3 minutes of pumping to grade
10	17.2	259	87		Mud to Hard Clay
					5 minutes of pumping to grade
11	15.7	169	12		Probing driven by hammer
					Mud to Rock Refusal
12	14.5	162	17		Mud to Rock Refusal
13	16.2	172	10		Mud to Rock Refusal
14	16.9	255	86	22	Soft Clay
15	8.1	250	169		Washed Probing
					Mud to Hard Clay
16	8.1	167	86	50	Mud to Clay
		181	14	51	Hard Clay
		187	06	125	Hard Clay
		191	04	100	Hard Clay
		202	1.1	300	Hard Clay
		214	1.2	277	Hard Clay
		218	04	100	Hard Clay
		227	09	400	Hard Clay
		227	07	100	Hard Clay Refusal
17	11.1	162	5.1		Soft Mud to Clay
		173	1.1	218	Hard Clay
		200	27	353	Hard Clay
		226	26	600	Hard Clay
		250	24	204	Hard Clay
18	13.1	251	120		Soft Mud
19	14.5	269	124		Soft Mud
20	15.3	251	98		Soft Mud
21	14.3	190	47		Soft Mud
		223	33	74	Soft Clay
		257	34	218	Soft to Hard Clay
22	8.3	176	93		Soft Mud & Clay
		198	22	400	Hard Clay
		222	24	900	Hard Clay Refusal

LIST OF PROBINGS					
NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W.		PENETRATION	MATERIAL
		DEPTH OF PROBE	BLOW COUNT		
23	10.1	184	83	150	Soft Mud & Clay
		211	27	450	Hard Clay
		237	26	125	Sand & Clay
		252	15	179	Sand & Clay
24	18.2	235	53	175	Mud to Hard Clay
		250	15	93	Hard Clay
25	16.1	257	96		Piston type pump rated at 1000 gals per hour. 1 minute of pumping to grade
26	18.3	237	54		Washed Probing
					1 minute - mud
		250	13		20 seconds - mud
27	22.0	251	31		Washed Probing
					Weight of pipe to grade
					Mud
28	7.6	148	72		Washed Probing
					Hard Clay Hard Pan
					Refusal
29	15.2	214	62		142 lb hammer
		254	40	18	Soft Mud
30	15.0	213	83		142 lb hammer
		263	30		Soft Mud
					Weight of hammer to grade
31	17.4	254	80		Soft Mud
					Weight of pipe to grade
32	19.0	254	64		Soft Mud
					Weight of pipe to grade
33	21.3	247	34		Mud to Rock
					Weight of pipe Refusal
34	22.3	255	32		Soft Mud
					Weight of pipe to grade
35	14.8	257	109		Soft Mud
					Weight of pipe and hammer to grade
36	21.3	267	54		Soft Mud
					Weight of pipe to grade
37	21.2	271	59		Weight of pipe to grade
42	16.4	325	161		Soft Mud
					Weight of pipe to grade
46	13.8	170	32		Weight of pipe - Mud
		187	17	25	Soft Clay
		201	14	30	Soft Clay
		211	10	29	Soft Clay
		221	10	55	Soft Clay
		231	10	72	Soft Clay
		241	10	67	Soft Clay
		251	10	63	Soft Clay
38	14.2	251	109		Washed Probing
					Mud to Clay
39	18.4	218	34		Washed Probing
					Mud to Rock Refusal
40	16.9	265	96		Soft Mud
					30 seconds of pumping to grade
41	17.2	270	98		Washed Probing
					Soft Mud
					15 seconds to grade
43	18.9	275	86		Washed Probing
					Mud
					15 seconds to grade
44	13.9	148	09		Washed Probing
					Rock
47	11.1	121	10	16	Soft Mud
		131	10	31	Soft Mud
		160	29	37	Soft Mud
48	3.2	41	09	12	Soft Mud
		42	01	9	Hard Clay
		48	06	100	Hard Clay
		58	10	224	Hard Clay
		61	03	200	Hard Clay
		63	02	200	Hard Clay
		64	01	100	Hard Clay
49	16.1	250	89		Washed Probing
					Mud to Clay
					4 minutes to grade
50	22.0	250	30		Washed Probing
					Weight of pipe to grade
51	21.9	264	45		Washed Probing
					Soft Mud
					Weight of pipe to grade

LIST OF PROBINGS					
NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W.		PENETRATION	MATERIAL
		DEPTH OF PROBE	BLOW COUNT		
52	22.1	291	70		Washed Probing
					Soft Mud
					Weight of pipe to grade
53	220	250	30		Washed Probing
					Soft Mud
					Weight of pipe to grade
54	21.6	250	34		Washed Probing
					Mud to Clay
					2 minutes to grade
55	19.8	268	70		Washed Probing
					Soft Mud
					Weight of pipe to grade
56	15.0	243	93		Washed Probing
					Hard Clay to Loose
					Rock & Gravel
					Refusal
					Void
57	18.6	200	14		Washed Probing
					Mud to Rock
58	14.3	180	3.7		Washed Probing
					Gravel to Rock
59	21.4	292	7.8		Washed Probing
					Soft Mud
60	18.7	242	5.5		Washed Probing
					Hard Clay to Rock
61	21.4	274	8.0		Washed Probing
					Mud
62	21.3	265	5.2		Washed Probing
					Mud
63	20.4	284	8.0		Washed Probing
					Mud
64	18.5	326	14.1		Washed Probing
					Mud
65	20.1	341	14.0		Washed Probing
					Mud
66	6.6	180	11.4		Mud
67	6.5	180	11.5		Mud
68	8.2	183	10.1		Mud

GLOUCESTER HARBOR
MASSACHUSETTS
PROBING TABLE

IN 2 SHEETS SHEET 2

NEW ENGLAND DIVISION, WALTHAM, MASS. JAN. 959

TO ACCOMPANY SURVEY
REPORT DATED DEC. 21, 1960

FILE NO. 250 Dr 36

GLOUCESTER HARBOR, MASSACHUSETTS
APPENDIX A
DIGEST OF CORRESPONDENCE

This appendix consists of 3 sections which set forth a digest of documents, correspondence and conferences pertaining to the requested Gloucester Harbor improvement, as submitted by local interests at the public hearing held by the Division Engineer, New England Division in Gloucester on November 7, 1956 and subsequent thereto. The hearing was held to determine the advisability of modifying the existing project at Gloucester Harbor.

The sections included in this digest are as follows:

<u>Section</u>	<u>Title</u>
1	Digest of Brief Submitted by Gloucester Harbor Improvement Committee, November 7, 1956.
2	Digest of Public Hearing.
3	Digest of Correspondence and Conferences.

Section 1. Digest of Brief Submitted by Gloucester Harbor Improvement Committee, November 7, 1956.

a. Extent of Improvement Work Requested.

(1) Dredging main channel beginning at #10 Buoy, 244° true from Ten Pound Island Light and continuing to and along the Northerly side of the State Fish Pier, to a depth of 20 ft. at m.l.w. and to a width of 600 ft., with removal of all ledges and underwater obstructions to this depth and width.

(2) Removal of ledge presently marked by N-20 Buoy and then move Buoy Southeasterly to widen the channel at that point.

(3) Dredging of Harbor Cove to a depth of 19 ft. at m.l.w. with removal of ledge opposite the Empire Fish Company.

(4) Dredging to a depth of 16 ft. at m.l.w. the area Southerly of the State Fish Pier adjacent to the finger pier wharves and extending outward toward the opposite shore.

(5) Dredging to a depth of 20 ft. at m.l.w. a turning basin approximately 350 yards square between Buoy N-14 and Buoy N-16, extending into the approach to Smith's Cove and continuing to a point just beyond the facilities of the Rocky Neck Ship Yards, Inc.

(6) Dredging to a depth of 14 ft. at m.l.w., area in Smith's Cove.

b. Present Navigation Difficulties.

(1) Shoaling, ledges and underwater obstructions have reduced portions of the main harbor channel to depths of less than 20 feet. This reduction in depth of channel has resulted in the grounding of vessels. Vessels have also been damaged when striking ledge and other underwater obstructions.

(2) Navigation of the channel is also made more difficult by the lack of a turning basin. There is not sufficient room in the existing channel for a vessel to turn to head out to sea or to turn to return to its wharf.

c. Landing and Servicing Facilities Presently Available in Harbor.

(1) Commercial Landings.

There are a total of 31 commercial wharf properties having a total frontage of 6,355 feet available for mooring. Depth of water at berths ranges from 9 to 22 feet at mean low water.

(2) Recreational Landings.

The Bickford Boat Service, Inc. at Rocky Neck, East Gloucester, has floating piers providing docking facilities for 40-45 craft of from 15-50 feet. Depth of water ranges from 2 to 9 feet at mean low water. Additional docking and mooring facilities are available at other boat yards and at the yacht clubs.

(3) Public Landings.

The town landing has a runway from the wharf to the float for loading and unloading passengers. Depth of water ranges from 4 to 6 feet at mean low water. Larger vessels may dock, by permission, at the State Fish Pier provided wharf space is not occupied by fishing vessels in process of unloading or outfitting.

(4) Boat Yards and Repair Facilities.

There are seven boat yards and repair facilities on the harbor providing all services attendant to navigation and boating. These seven yards also provide an aggregate of 5 piers, each 100 feet long, 10 railways capable of hauling boats up to 50 feet in length, wharves, runways, floats, one crane having a capacity of 10 tons and one having a capacity of 50 tons. Storage capacity is also provided for approximately 300 boats.

(5) New Facilities Planned.

Plans are underway to acquire the Davis Bros. Fisheries Company property with wharf frontage of approximately 200 feet. It is expected that the wharf area may be used for vessel mooring or developed into a marina providing docking facilities and services for yachts and pleasure craft.

d. Present Use of Harbor.

(1) Fishing Industry.

Gloucester is one of the largest fish producing ports in the country. Edible fish landings in 1955 amounted to 177,686,000 pounds for which fishermen and vessel owners were paid a total of \$6,985,000. The non-edible fish landings in 1955 amounted to 75,859,000 pounds for which fishermen and vessel owners were paid a total of \$946,000. From 80% to 90% of the edible fish is filleted and frozen with the remainder being sold whole, fresh or frozen. Non-edible fish and fish waste remaining after filleting are used in the manufacture of vitamin and commercial fish oils, fish solubles and fish meal used in animal feeding. In addition to domestic fish landings, frozen fish blocks are imported from Canada, Nova Scotia, Newfoundland and Iceland. These fish blocks are processed into fish sticks. Imports other than fish blocks consist of fish fillets, fish and cod liver oils, salted and smoked fish, whale meat, beviies and other items.

(2) Recreational Boating.

The combination of the outer harbor, protected by the Breakwater, and the inner harbor with its extensive wharf frontage, its boat yards and landing facilities, has resulted in a continued increase in the number of pleasure craft, small and large, both local and transient.

Units of the Power Squadron and various out-of-state yacht clubs visit here frequently during the yachting season. Other yachts, sport cruisers, and sailing craft make Gloucester their home base during the summer. There are continual visitations here of yachts from nearby Clubs. Weekly regattas are held for sailing craft of all classes.

There are two Yacht Clubs - the Annisquam Yacht Club and the Eastern Point Yacht Club. Each has a large membership and a total of upwards to 200 boats of various types in their combined Club fleets. Transient boats using the facilities of both Clubs during the season number well up to 1,000. With the mounting interest in boat and water recreation, activities of both Clubs will continue to increase.

Section 2. Digest of Public Hearing.

This section of the appendix presents a digest of the public hearing held by the Division Engineer, New England Division in Gloucester, Massachusetts on November 7, 1956. The hearing was held to determine the advisability of modifying the existing project at Gloucester Harbor.

SECTION 2. DIGEST OF PUBLIC HEARING

<u>Speaker</u>	<u>Interest Represented</u>	<u>Improvement Desired</u>	<u>Other Remarks</u>
Mr. John T. Hannon Senior Civil Engineer	Mass. Dept. of Public Works	Additional dredging of Harbor	Read a letter from the Director of Waterways which stated importance of Gloucester Harbor to the economy of the City of Gloucester and of the north shore area of Mass. Also indicated extent of past and proposed improvements by the Commonwealth and the City and cooperation of the Commonwealth in prior Federal projects. Feels that same policy of cooperation will continue.
A-5 Mrs. Beatrice K. Corliss Mayor	City of Gloucester	As will be indicated by the Improvement Committee	Indicated extent of expenditures by the Commonwealth, the City and private business for harbor improvements and recommends favorable action on proposed improvement.
General Richard U. Mayo City Manager	City of Gloucester	-	Introduced Mr. Everett R. Jodrey, Chairman of Gloucester Harbor Improvement Committee.
Mr. Everett R. Jodrey Chairman, Gloucester Harbor Improvement Committee	City of Gloucester	As indicated in the Brief summarized under Section 1 of this Appendix.	Increase in the number of large boats and foreign vessels coming into the harbor necessitates deeper channels and the removal of ledge and other underwater obstacles to eliminate hazards to navigation and to facilitate the maneuvering of ships within the harbor.

Mr. Lawrence E. McEwen	The Cooper Bessemer Corp.	Additional dredging of the Harbor	Utilized map indicating areas under consideration and explained existing conditions in the areas involved which conditions caused tidal delays to ships transiting the channel.
Mr. Robert N. Fisher Shipyard Operator	Gloucester Marine Railways Corporation Rock Neck Shipyards, Inc. Hall Brothers, Inc.	Channel dredging and providing an anchorage	Stated that Harbor is shoaling out and has resulted in stranding vessels and has precluded vessels entering the harbor. Indicated that the grounding out of 4 vessels in a 120 day period cost the owners \$14,000. Also indicated that a lack of anchorage results in the shifting of vessels from dock to dock
seeking wharfage space. An anchorage is also needed to provide a haven			for coastal vessels during storms.
Mr. Manuel F. Lewis Union Agent	Gloucester Seafood Workers Union	Deeper channels new dockage space, removal of ledge	Indicated that there is opportunity to bring in larger steamers into Gloucester carrying greater tonnage. Feels that existing Harbor conditions jeopardizes the fishing industry and particularly restricts its growth. Also indicated that ships have been subjected to tidal delays in entering and leaving the Harbor.
Mr. Michael J. Burke Manager	Quincy Market Cold Storage and Warehouse Company	Harbor Improvements	Indicated that his company is vitally interested in any improvement in the Harbor. Stated that his company is contemplating construction of an other building in Gloucester, but its construction will depend on the improvements to be made to the Harbor.

Mr. Albert E. Martell
Deputy Collector of Customs

Stated that customs collections on foreign imports had increased from about \$100,000 in 1952 to over \$1,000,000 in 1956. Also indicated specific instances of grounding, striking ledge, damage to the existing submarine cable. Further

indicated that inquiries had been sent to his office in connection with the dredging of the channel, and that these inquiries were in turn forwarded to proper authorities.

Mr. Alphonse F. Hayes
Port Agent

Atlantic Fisherman's
Union

Harbor Improvement

Indicated that about 2500 men and their families depend on the fishing industry and consequently on Harbor conditions. Noted that insufficient channel depth has either

kept larger vessels out of Gloucester or has resulted in excessive tidal delay and expense.

Mr. Ray Kershaw
Manager of Gloucester
Whiting Association

54 vessels - members
of Gloucester Whiting
Association

Dredging of Harbor
Cove

Utilized map indicating areas under consideration to show location of shoaling in harbor cove. Because of this shoaling, boats churn up the bottom and a fine silt works itself into the boat engines,

plugging them and causing over heating, vessels with drafts ranging from 7 to 12 feet.

Mr. Benjamin A. Smith, II
President

Gloucester
Community Fish Pier
Corp.

Turning basin dredging
channel on south side
of fish pier to 16
feet.

Noted that with vessels docked at the State Pier and at piers on the opposite shore. There is not sufficient room for vessels to turn. They must back out. An

increase in the size of vessels and in the number of vessel trips to Gloucester Harbor necessitates additional dredging of channels. The use of larger vessels, due to competition with other ports, will also necessitate deeper channels.

Mr. Alan G. Hill, Jr.
President and General
Manager

Bickford Boat
Service

Development of
anchorage into
Smith Cove

Read a letter calling attention to the easterly section of the harbor used by small boats. Existing conditions are such that additional dockage cannot be developed and many boats visiting the area cannot be serviced. Adequate dredging could make Gloucester one of the largest small boat ports on the east coast and would permit future construction and use of additional dockage and servicing facilities.

Mr. Francis E. Thomas
Yacht Yard Operator

Burnham and Thomas
Yacht Yard

Favor dredging
project

Stated that yachting publications show Gloucester as a beautiful harbor with good sheltered area but few servicing facilities. Pleasure boating industry is working to improve servicing facilities so as to attract more pleasure boats to the area. These pleasure boats contribute to the economy of the city.

Mr. Donald P. Brown
President-Treasurer

Gloucester Yacht
Yards, Inc.

Dredging of channel
east of Fish Pier and
Dredging Smith Cove

Stressed shortage of anchorage and stated that many boats are unable to get anchorage. Favors dredging inner harbor east of the fish pier and Smith Cove. Feels these two areas will provide adequate anchorage,

Mr. John C. Alexander
Treasurer and Manager

Beacon Marine
Basin

Harbor dredging

Noted shortage of anchorage and indicated that only a limited space is available as anchorage for transients. Indicated that the Beacon Marine Basin favors dredging.

Mr. Lawrence J. Hart Manager	Gloucester Chamber of Commerce	Harbor Improvement and increasing channel depth	Briefly reviewed vessel traffic in the harbor. Noted that off- shore fleet comprised 165 vessels over 5 tons gross plus 30 or 40 vessels documented at other ports and about 200 vessels under 5 tons gross comprised in- shore fleet. Adding pleasure craft to the commercial traffic results in a substantial amount of vessel traffic. Also reviewed volume of waterborne commerce and indicated that harbor improve- ments would attract larger vessels with heavier tonnage.
Mr. Robert D. Tobey Assistant Cashier, Cape Anne National Bank; City Councillor	City of Gloucester	Deeper channels and enlarged areas for pleasure craft.	Noted that there are many smal- ler areas which could be developed into anchorages and urges con- sideration of these areas in the overall analysis of the plan of improvement.
Mr. George Heardman	Petition of 56 names	Dredging to a pier in Fresh Water Cove	Indicated that a petition of 56 names was sent to the City Council for action in dredging to a pier in Fresh Water Cove. Wishes to have this area con- sidered in the plan of improve- ment.
Mr. Harry Clatterburg	Master Mariner	Dredging to a pier in Fresh Water Cove	In favor of dredging in Fresh Water Cove.

SECTION 3. DIGEST OF CORRESPONDENCE AND CONFERENCES

<u>Speaker</u>	<u>Interest Represented</u>	<u>Improvement Desired</u>	<u>Date</u>	<u>Other Remarks</u>
Mr. D. H. Daggett	Birds Eye Division General Foods Corp.	Dredging Inner Harbor Channel to 20 feet , removal of ledge, annual maintenance	Letter 26 Oct 56	Foreign vessels unloading fish blocks for the company have drafts of 16 or 17 feet. Larger boats from Iceland will require more draft. Ledges are navigation hazards and should be removed. Annual maintenance will provide a clean harbor free from ob- noxious odors.
Hon. William H. Bates Member of Congress	City of Gloucester	Navigation Improvements	Telegram 7 Nov 56	Telegram expressed interest in prompt action on study. Indicates that improvements necessary since larger and faster fishing vessels must have adequate harbor facilities.
Brig. Gen. Richard W. Mayo (ret) City Manager Mr. Henry Lasley City Engineer	City of Gloucester	Reduce width of channel from 600 to 300 feet and increase depth of channel and turning basin from 20 to 25 feet. Eliminate Harbor Cove and Smith Cove.	Conference 6 Feb 57	Proposed construction of new city State Pier would require revision to channel to accommodate shipping. The reduction in width of the channel has been con- sidered to compensate in part for the additional depth requested. Work in Smith Cove and Harbor Cove is to be done by others.
Hon. William H. Bates Member of Congress	City of Gloucester	Navigation Improvements	Letter 21 Mar 57	Transmits letter from Gloucester Committee on development of port facilities requesting assistance in expediting study and appropriating funds.

Brig. Gen. Richard
W. Mayo (Ret.)
City Manager

City of Gloucester

A channel 300
feet wide and 30
to 32 feet deep
at m.l.w. from the
outer harbor through
Western Harbor and
Blynman Canal. A
turning basin
removal of ledge

Letter
29 Apr 57

Indicates that adverse
effect on fishing industry
is anticipated due to
decision that tariff on
certain fish and fish
products would not be in-
creased. Requests con-
sideration of larger
channel as a means of
developing commercial
shipping to offset

faltering fishing industry. Should the larger channel be considered feasible the city and the Common-
wealth will seek to appropriate \$1,500,000 for construction of additional pier facilities in Gloucester
harbor.

Mrs Beatrice Corliss
Mayor
Mr. Philip Tartas
City Manager
Mr. Henry Lasley
City Engineer

City of Gloucester

Consideration of
project for deep
draft vessels

Conference
29 Oct 58

A conference was held
with Corps of Engineer
personnel to discuss the
probabilities of a practi-
cable project being developed
for deep draft commercial
shipping. City officials

were requested to advise the Division Engineer before November 10, 1958 of what the present city position
and desire is for study of harbor improvements.

Mr. Philip Tartas
City Manager

City of Gloucester

Cancels city's
request for channel
from outer Harbor
through Western
Harbor and Blynman
Canal and reconsider
original improvement
requested at hearing
modified to provide a
channel depth of 22 feet
and delete dredging of
Smith Cove.

Letter 4 Feb
59

Letter transmits copy of
vote of City Council dated
January 29, 1959 accepting
recommendation of Gloucester
Industrial Commission that
the desired improvements
be revised as indicated under
improvements desired.

Mr. Lawrence J. Hart Manager	Gloucester Chamber of Commerce	Revised harbor improvements as indicated in report under "Desired Improve- ment"	Letter 15 May 59	Transmits supplement dated May 12, 1959 to brief dated November 7, 1956 submitted at the hearing held at Gloucester, Mass., on November 7, 1956. The supplement to the original brief sets forth the revised improvement to Gloucester Harbor as requested by the City.
Mr. Lawrence J. Hart Manager	Gloucester Chamber of Commerce	-	Letter 11 Sep 59	Transmits information relative to vessels entering other ports during 1958 and from which part cargo shipments of frozen fish blocks were trucked to Gloucester. Letter also transmits infor- mation on trucking costs, storage capacity and vessel traffic for the period 1 January - 11 September 1959.
Mr. V. L. Andrelinnas Acting Chief, Project Ops. Branch, Providence Area Office	New England Division Corps of Engineers	-	Memo 12 Feb 60	Report of investigation of obstruction in Gloucester Harbor, Mass. Investigation was conducted as a result of reports of 2 vessels striking bottom abreast of buoy #20. Fathometer soundings indicated a considerable shoal channel ward of buoy #20. The shoal appears to be 50 to 60 feet wide and of undetermined length but greater than 60 feet. The least sounding recorded was 7.6 feet.
Mr. Lawrence J. Hart Manager	Gloucester Chamber of Commerce	-	Letter 26 Feb 60	Transmits listing of foreign registered vessels landing cargo at Gloucester. 126 vessel trips landed 71,858,000 pounds of cargo during 1959.

Mr. Philip Tartas City Manager	City of Gloucester	Additional	Conference	Conference was held with
Mr. Lawrence J. Hart Manager	Gloucester Chamber of Commerce	dredging of	24 Feb 60	representatives of the New
Mr. Stanley Bowdreau Mayor	City of Gloucester	channel NE of		England Division to discuss
Mr. Henry J. Lasley Director	Dept. of Public Works City of Gloucester	Smith Cove to a		the results of the study of
Mr. Everett Jodrey Chairman	Gloucester Harbor Development Commission	depth of 20 feet to		the desired improvement of
Mr. Theodore R. Love Chief Engineer	Quincy Market Cold Storage & Whse Co.	a point approxi- mately 300 feet NE of station salt		Gloucester Harbor. Local inter- ests expressed favorable comment with the improvement plan selected. In view of the pending development of additional terminal facilities northeast of Smith Cove, local interests requested considera- tion of additional dredging of the channel northeast of Smith Cove.

Mr. Charles L. McLaughlin Director	Mass. Division of Fisheries & Game	-	Letter 13 Jun 60	Advises that the Division of Fisheries and Game of the Commonwealth of Massachusetts contemplates no adverse effects on Fish and Wildlife due to the proposed harbor improvement.
Mr. Theodore R. Love Chief Engineer	Quincy Market Cold Storage and Whse Co.	-	Letter 20 Jun 60	Indicates that interest represented expects to initiate construction in 1960 on additional terminal facilities which will increase foreign vessel traffic by approximately 50%. Additional imports will consist of frozen fish blocks and fish products.
Mr. G. C. Matthiessen Assistant Director	Dept. of Natural Resources Division of Marine Fisheries	-	Letter 18 Jun 60	Advises that the proposed improvement of Gloucester Harbor will have no adverse effect on Fish and Wildlife.

GLOUCESTER HARBOR, MASSACHUSETTS

APPENDIX B

TERMINAL FACILITIES

This appendix sets forth the name and location of the commercially important wharves in Gloucester Harbor. It also indicates the type of construction, present condition and frontage of each wharf, the depth at mean low water, the facilities available and the use of the wharf.

Commercial Port and Terminal Facilities

Gloucester Harbor, Massachusetts

<u>Name and Location</u>	<u>Type of Construction</u>	<u>Frontage</u>	<u>Depth at M. L. W.</u>	<u>Facilities</u>	<u>Use</u>
Cape Ann Fisheries, Inc. Fort Square	Wood Construction, excellent condition	200	14	Two hoists, water and fuel available storage facilities for frozen fish and ice.	Receipt of fish
Producers Fish Co. Fort Square	Wood Construction, excellent condition	150	14	Two hoists, cooler water and fuel available.	Receipt of fish
O'Donnell-Usen Fisheries Corp. Fort Square	Wood Construction, good condition	330	10-12	Freezer storage 1000 tons	Receipt of fish
Cape Pond Ice Co. Commercial Street	Wood Construction, excellent condition	250	15	Ice storage 300 tons per 24 hrs. largest on North- east Atlantic Coast.	Sale of ice to fishing boats.
Progressive Fish Wharf Co., Inc. Commercial Street	Wood Construction, good condition	75	10-12	One hoist, water and fuel available.	Receipt of fish
North Atlantic Fisheries Company 88 Commercial Street	Wood Construction, good condition	200	14	One hoist, water available.	Receipt of fish
Birdseye Division General Foods Corp. 51 Commercial Street	Wood Construction, Fair condition	100	16	Water available	-

<u>Name and Location</u>	<u>Type of Construction</u>	<u>Frontage</u>	<u>Depth at M. L. W.</u>	<u>Facilities</u>	<u>Use</u>
Harbor Cove Fisheries 52 Commercial Street	Wooden Construction, fair condition	90	9-10	One hoist, 1000 ton freezer	Receipt of fish
Joseph Frontiero's Wharf Commercial Street	Wooden Construction, excellent condition	100	12	-	-
Shell Oil Co. 9 Rogers Street	Wood Construction, poor condition	75	12	Fuel	-
Lafond's Wharf 11 Rogers Street	Wood Construction, fair condition	50	12	-	-
Fishermen's Wharf, Inc. Rogers Street, rear	Wood Construction, good to excellent condition	200		Manual unloading facilities, water and fuel available	Receipt of fish
Davis Bros. Fisheries Company 45 Rogers Street	Wood Construction, fair condition	200	9-10		Receipt of fish
Quincy Cold Storage & Warehouse Company Rogers Street	Wood Construction, fair condition	160	12	Cold storage facilities, water available.	Receipt of fish
Frank E. Davis Fish Co. 93 Rogers Street	Wood Construction, excellent condition	30	12	-	Receipt of fish
The Building Center Gloucester Coal & Lumber Company 89 Duncan Street	Wood Construction fair condition	200	12	-	-
Empire Wharf rear 99 and 101 Duncan Street	Brick wood and steel construction, good to excellent condition	150	12	Mechanical unload- ing, cold storage capacity 400 tons, water and fuel available.	Receipt of fish

<u>Name and Location</u>	<u>Type of Construction</u>	<u>Frontage</u>	<u>Depth at M. L. W.</u>	<u>Facilities</u>	<u>Use</u>
Independent Fish Co. Railway Avenue	Wood Construction, fair condition	250	15-18	Water available	Receipt of fish
Mrs. John Chianciola Wharf Railway Avenue	Wood Construction, good condition	75	15-18	Fuel	Receipt of fish
Leonard Weisman Wharf Wharf Street	Wood Construction, poor condition	50	15-18	-	-
Fabet Corporation 35 Wharf Street	Wood Construction, good condition	220	14	Conveyor system, stainless steel pen room	Receipt of fish
Frank F. Smith Wharf Wharf Street	Wood Construction, poor condition	50	15-18	-	-
Sherman B. Ruth Wharf Bruce Place	Wood Construction, fair condition	100	15-18	-	-
Gortons of Gloucester 327 Main Street	Wood Construction, good condition	300	12-18	Crane water and fuel available	Receipt of fish
Quincy Market Cold Storage & Warehouse Company Rowe Square	Wood Construction, excellent condition	300	22	12000 ton freezer, cranes, and cold storage facilities, water and fuel available	Receipt of fish, dry & frozen imports.
Gloucester Oil Supply Company 403 Main Street	Wood Construction, good condition	160	15	Pipe line to steel oil tanks, water and fuel available	Receipt and sale of petroleum products
United Fisheries Co. 405 Main Street	Wood Construction, fair condition	150	12	Fuel and water available	Receipt of fish

<u>Name and Location</u>	<u>Type of Construction</u>	<u>Frontage</u>	<u>Depth at M. L. W.</u>	<u>Facilities</u>	<u>Use</u>
Imperial Seafoods Co. 417 Main Street	Concrete block and concrete construction, fair condition	280	9	Cold storage ware- house, water available	Receipt of fish
B. & B. Fish Company 17 Parker Street	Wood Construction, poor condition	60	4	-	Receipt of fish
Shoares Wharf rear 239 E. Main Street	Wood Construction, fair condition, open pilings	400	-	Net storage shed	-
Gloucester State Fish Pier Parker St.	Solid filled pier with cement layer and black top surfacing with wharf platform 40 feet wide on north side	North side 1200 feet. Two finger piers with combined usable frontage of 200.	22 feet at M.L.W. for 800 feet on north side then shoaling to shal- lower depths. Two finger piers have a depth of 12 feet at mean low water.	5 firms with stalls for fish pro- cessing, cold storage facilities for 3500 tons.	Receipt of fish, mooring Coast Guard cutters.
Quincy Market Cold Storage & Warehouse Co. 159 East Main St. E. Gloucester Terminal (Construction Aug 1960 to June 1961)	Steel bulkhead, steel pile with concrete deck 30 feet wide	600'	20 feet	8,500 ton freezer, cranes, cold sto- rage warehouse, dry storage ware- house, Truck ship- ping platform. Water and fuel available.	Receipt of dry and frozen imports.

Boatyard Information Sheet

<u>Name and Location</u>	<u>Number of Railways</u>	<u>Capacity of Railways</u>	<u>Services Available</u>	<u>Storage Facilities</u>	<u>Average No. Boats Serviced past 5 Years</u>
Gloucester Marine Railways Corp. and Rocky Neck Shipyards 9 Wharf Street	6	5 - 350 tons 1 - 650 tons	General shipyard repair	Wet and dry storage for 50 trawlers and yachts	3000 annually
Beacon Marine Basin, Inc. 211-221 East Main St. Gloucester, Mass.	-	-	Machine, carpenter, welding and painting work	Covered, open and wet storage for 70 boats	250 annually
Gloucester Yacht Yards, Inc. End of Montgomery Place and Clay St.	1	50'x 14'	Hauling, propellor, painting, carpentry, rigging and general yacht yard work	Inside storage 50-60 boats, outside storage 15 boats	150-200 annually
Burnham & Thomas Yacht Yards End of Norwood Court	-	-	General repairs, crane - load capacity; 10 tons	Inside storage for 25 small boats	Indeterminable
Bickford Boat Service, Inc. Rocky Neck	1	Boats 40 to 50 feet	General repair work	-	-
Reed's Automotive Marine Service, Inc. Parker Street	1	Boats 45 to 50 feet	General repair work, gasoline, oil, water and electricity	Storage for 15 boats	-

Gloucester Harbor, Massachusetts
APPENDIX C
ESTIMATES OF FIRST COST

1. The first costs are given below for each item of improvement considered in this report. Federal construction consists of dredging and removal of rock or ledge. The U.S. Coast Guard will provide necessary additional navigation aids.

2. Probings made during this and prior studies indicate that dredging will consist of mud, sand, gravel and ledge rock. Removal of the rock will require drilling and blasting and dipper dredge, and it is anticipated that all the material will be removed by dipper dredge and spoiled at sea.

3. Dredging quantities are in terms of in place measurement and include an allowance of 1 foot for overdepth and side slopes of 1 vertical on 3 horizontal. Cost estimates are based on prices prevailing in November 1960.

PROJECT COST ESTIMATES
Item 1-Channel 22 Feet Deep From Entrance
to Northwest of Fish Pier

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 70,000 c.y. of ordinary material @ \$1.60	112.0	
	Contingencies @ 15%	17.0	129.0
	Dredging 6,000 c.y. of hard material requiring drilling of blasting @ \$20.00	120.0	
	Contingencies @ 15%	18.0	<u>138.0</u>
	Rock removal (11,000 c.y. of ledge rock @ \$50.00)	550.0	
	Contingencies @ 15%	83.0	633.0
29	PREAUTHORIZATION STUDIES		11.0
30	ENGINEERING & DESIGN		11.0
31	SUPERVISION & ADMINISTRATION		<u>62.0</u>
	Corps of Engineers	Total (Nov 1960)	984.0
	Aids to Navigation (Coast Guard)		<u>3.0</u>
		Total	987.0

Item 1-Channel 20 Feet Deep From Entrance
to Northwest of Fish Pier

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 22,000 c.y. of ordinary material @ \$2.00	44.0	
	Contingencies @ 15%	7.0	51.0
	Dredging 2,000 c.y. of hard material requiring drilling and blasting @ \$20.00	40.0	
	Contingencies @ 15%	6.0	46.0
	Rock removal (7,000 c.y. of ledge rock @ \$50.00)	350.0	
	Contingencies @ 15%	52.0	402.0
29	PREAUTHORIZATION STUDIES		11.0
30	ENGINEERING & DESIGN		8.0
31	SUPERVISION & ADMINISTRATION		<u>37.0</u>
	Corps of Engineers	Total (Nov 1960)	555.0
	Aids to Navigation (Coast Guard)		<u>3.0</u>
		Total	558.0

Item 2-Channel 16 Feet Deep and 150 Feet Wide
to Southeast of Fish Pier

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 22,000 c.y. of ordinary material @ \$2.00	44.0	
	Contingencies @ 15%+	7.0	51.0
29	PREAUTHORIZATION STUDIES		4.0
30	ENGINEERING & DESIGN		2.0
31	SUPERVISION & ADMINISTRATION		<u>5.0</u>
	Corps of Engineers	Total (Nov 1960)	62.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	63.0

Item 2-Channel 18 Feet Deep and 150 Feet Wide
to Southeast of Fish Pier

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 44,000 c.y. of ordinary material @ \$1.75	77.0	
	Contingencies @ 15%	12.0	89.0
29	PREAUTHORIZATION STUDIES		4.0
30	ENGINEERING & DESIGN		3.0
31	SUPERVISION & ADMINISTRATION		<u>8.0</u>
	Corps of Engineers	Total (Nov 1960)	104.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	105.0

Item 2a-Channel 18 Feet Deep and 200 Feet Wide
to Southeast of Fish Pier

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 53,500 c.y. of ordinary material @ \$1.75	94.0	
	Contingencies @ 15%	14.0	108.0
29	PREAUTHORIZATION STUDIES		4.0
30	ENGINEERING & DESIGN		3.0
31	SUPERVISION & ADMINISTRATION		<u>8.0</u>
	Corps of Engineers	Total (Nov 1960)	123.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	124.0

Item 2a-Channel 20 Feet Deep and 200 Feet Wide
to Southeast of Fish Pier

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 90,800 c.y. of ordinary material @ \$1.60	145.0	
	Contingencies @ 15%	22.0	167.0
29	PREAUTHORIZATION STUDIES		4.0
30	ENGINEERING & DESIGN		3.0
31	SUPERVISION & ADMINISTRATION		<u>11.0</u>
	Corps of Engineers	Total (Nov 1960)	185.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	186.0

Item 3-Channel 16 Feet Deep into Smith Cove

Cost Account Number	Item		<u>Cost Estimate</u> (x \$1,000)
09	Dredging 16,000 c.y. of ordinary material @ \$2.00	32.0	
	Contingencies @ 15%	5.0	37.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>5.0</u>
	Corps of Engineers	Total (Nov 1960)	44.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	45.0

Item 3-Channel 22 Feet Deep into Smith Cove

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 104,000 c.y. of ordinary material @ \$1.60	165.0	
	Contingencies @ 15%	25.0	190.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		3.0
31	SUPERVISION & ADMINISTRATION		<u>13.0</u>
	Corps of Engineers	Total (Nov 1960)	207.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
		Total	208.0
	Required Non-Federal Costs		
	Berth Improvements (Self-liquidating) Not Estimated		

Item 4-Removal of Ledge off Empire Fish Co. Wharf
Ledge is in Berth Area - No Estimate Made

Item 5-Channel 18 Feet Deep into Harbor Cove

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 2,000 c.y. of ordinary material @ 2.00	4.0	
	Contingencies @ 25%	1.0	5.0
	Dredging 6,000 c.y. of hard material requiring drilling & blasting @ \$20.00	120.0	
	Contingencies @ 15%	18.0	138.0
29	PREAUTHORIZATION STUDIES		2.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>9.0</u>
	Corps of Engineers	Total Cost (Nov 1960)	155.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
	Total		156.0

Item 5-Channel 20 Feet Deep into Harbor Cove

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 19,000 c.y. of ordinary material @ \$1.75	33.0	
	Contingencies @ 15%	5.0	38.0
	Dredging 10,000 c.y. of hard material @ \$20.00	200.0	
	Contingencies @ 15%	30.0	230.0
29	PREAUTHORIZATION STUDIES		2.0
30	ENGINEERING & DESIGN		3.0
31	SUPERVISION & ADMINISTRATION		<u>17.0</u>
	Corps of Engineers	Total Cost (Nov 1960)	290.0
	Aids to Navigation (Coast Guard)		<u>1.0</u>
	Total		291.0
	Required Non-Federal Costs		
	Berth Improvements (Self-liquidating)		<u>50.0</u>
	Total Federal & Non-Federal Cost		341.0

Item 6-Channel 18 Feet Deep West of Harbor Cove

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 10,000 c.y. of ordinary material @ \$2.00	20.0	
	Contingencies @ 15%	3.0	23.0
	Dredging 2,000 c.y. of hard material requiring drilling & blasting @ \$20.00	40.0	
	Contingencies @ 15%	6.0	46.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>4.0</u>
	Corps of Engineers	Total (Nov 1960)	75.0
	Aids to Navigation (Coast Guard)		0.0

Item 6-Channel 20 Feet Deep West of Harbor Cove

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 20,000 c.y. or ordinary material @ \$1.75	35.0	
	Contingencies @ 15%	5.0	40.0
	Dredging 6,000 c.y. of hard material requiring drilling & blasting @ \$20.00	120.0	
	Contingencies @ 15%	18.0	138.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		2.0
31	SUPERVISION & ADMINISTRATION		<u>14.0</u>
	Corps of Engineers	Total (Nov 1960)	195.0
	Aids to Navigation		0.0
	Required Non-Federal Costs		
	Berth Improvements (Self-liquidating)		<u>10.0</u>
	Total Federal & Non-Federal Costs		205.0

Item 7-Anchorage 15 Feet Deep East of Harbor Cove

Cost Account Number	Item	Cost Estimate (x \$1,000)
	No dredging required	
	Total (Nov 1960)	0.0

Item 8-Anchorage 16 Feet Deep Opposite Smith Cove

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 5,000 c.y. of ordinary material @ \$2.00	10.0	
	Contingencies @ 15%	1.0	11.0
29	PREAUTHORIZATION STUDIES		0.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>2.0</u>
	Corps of Engineers	Total (Nov 1960)	14.0
	Aids to Navigation		0.0

Item 9-Removal of Isolated Rock Shoal 24 Feet Deep

Cost Account Number	Item		Cost Estimate (x \$1,000)
09	Dredging 2,000 c.y. of material overlying ledge rock @ \$10.00	20.0	
	Contingencies @ 15%	3.0	23.0
	Rock Removal (1,000 c.y. @ \$50.00)	50.0	
	Contingencies @ 15%	8.0	58.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>9.0</u>
	Corps of Engineers	Total (Nov 1960)	92.0
	Aids to Navigation		0.0

Item 9-Removal of Isolated Rock Shoal 25 Feet Deep

Cost Account Number	Item		Cost Estimate <u>(x \$1,000)</u>
09	Dredging 5,000 c.y. of material overlying ledge rock @ \$10.00	50.0	
	Contingencies @ 15%	8.0	58.0
	Rock Removal (2,000 c.y. @ \$50.00)	100.0	
	Contingencies @ 15%	15.0	115.0
29	PREAUTHORIZATION STUDIES		1.0
30	ENGINEERING & DESIGN		1.0
31	SUPERVISION & ADMINISTRATION		<u>13.0</u>
	Corps of Engineers	Total (Nov 1960)	188.0
	Aids to Navigation		0.0

4. The estimate of cost for the total modification recommended in the report is given below.

Cost Account Number	Item	Cost Estimate (x \$1,000)
09	Channels - 16', 18' & 20' channels and anchorage, removal of a shoal to 24'	
	(Dredging ordinary material 147,800 c.y. @ \$1.86	275.0
	Contingencies @ 15%	42.0)
		317.0
	(Dredging hard material 10,000 c.y. @ \$20.00	200.0
	Contingencies @ 15%	30.0)
		230.0
	(Rock removal 8,000 c.y. @ \$50.00	400.0
	Contingencies @ 15%	60.0)
		460.0
29	PREAUTHORIZATION STUDY COSTS	20.0
30	ENGINEERING & DESIGN	16.0
31	SUPERVISION & ADMINISTRATION	<u>77.0</u>
	Total Cost (Corps of Engineers)	1,120.0
	Coast Guard (Aids to Navigation)	<u>6.0</u>
	Total Federal Costs	1,126.0
	Total Non-Federal Costs	0.0

GLOUCESTER HARBOR, MASSACHUSETTS
APPENDIX D
ESTIMATES OF ANNUAL CHARGES

1. The estimated annual charges have been computed on an assumed project life of 50 years with an interest rate of 2.625 percent on Federal investment. As the benefits from the improvement would accrue to commercial navigation, annual charges have been computed on the basis that the cost of the improvement will be entirely borne by the United States.

2. Maintenance costs are based on shoaling over various sections of the harbor determined from actual hydrographic survey showing differences in depths over a period of 25 years. The estimated annual carrying charges for each of the various items of improvement are computed as follows:

Item 1 - Channel from entrance to northwest of Fish Pier

<u>Investment</u>	<u>Depth</u>	
	<u>22 Feet</u>	<u>20 Feet</u>
Construction (Corps of Engineers)	\$973,000	\$544,000
Preauthorization Studies (Corps of Engineers)	11,000	11,000
Aids to Navigation (Coast Guard)	<u>3,000</u>	<u>3,000</u>
Total Investment	\$987,000	\$558,000
<u>Annual Charges</u>		
Interest (0.02625 x Investment)	\$ 25,800	\$ 14,600
Amortization (0.00989 x Investment)	9,700	5,600
Maintenance: Dredging	5,200	4,400
Maintenance: Aids to Navigation	<u>200</u>	<u>200</u>
	\$ 40,900	\$ 24,800

Item 2 - Channel 150 feet wide to southeast of Fish Pier

<u>Investment</u>	<u>Depth</u>	
	<u>18 Feet</u>	<u>16 Feet</u>
Construction (Corps of Engineers)	\$100,000	\$ 58,000
Preauthorization Studies (Corps of Engineers)	4,000	4,000
Aids to Navigation (Coast Guard)	<u>1,000</u>	<u>1,000</u>
Total Investment	\$105,000	\$ 63,000
<u>Annual Carrying Charge</u>		
Interest (0.02625 x Investment)	\$ 2,700	\$ 1,600
Amortization (0.00989 x Investment)	1,000	600
Maintenance	2,100	1,600
Maintenance Aids	<u>200</u>	<u>200</u>
	\$ 6,000	\$ 4,000

Item 2a - Channel 200 feet wide to southeast of Fish Pier

<u>Investment</u>	<u>Depth</u>	
	<u>20 Feet</u>	<u>18 Feet</u>
Construction (Corps of Engineers)	\$181,000	\$119,000
Preauthorization Studies (Corps of Engineers)	4,000	4,000
Aids to Navigation (Coast Guard)	<u>1,000</u>	<u>1,000</u>
Total Investments	\$186,000	\$124,000
<u>Annual Carrying Charges</u>		
Interest (0.02625 x Investment)	\$ 4,900	\$ 3,200
Amortization (0.00989 x Investment)	1,900	1,200
Maintenance	3,200	2,400
Maintenance Aids	<u>200</u>	<u>200</u>
	\$ 10,200	\$ 7,000

Item 3 - Channel into Smith Cove

<u>Investment</u>	<u>Depth</u>	
	<u>22 Feet</u>	<u>16 Feet</u>
Construction (Corps of Engineers)	\$206,000	\$ 43,000
Preauthorization Studies (Corps of Engineers)	1,000	1,000
Aids to Navigation	<u>1,000</u>	<u>1,000</u>
Total Investment	\$208,000	\$ 45,000
<u>Annual Carrying Charge</u>		
Interest (0.02625 x Investment)	\$ 5,500	\$ 1,200
Amortization (0.00989 x Investment)	2,000	400
Maintenance	2,600	1,300
Maintenance Aids	<u>100</u>	<u>100</u>
	\$ 10,200	\$ 3,000

Item 4 - Removal of ledge off Empire Fish Co. Wharf. Ledge is in berth area -
No estimate made.

Item 5 - Channel into Harbor Cove

<u>Investment</u>	<u>Depth</u>	
	<u>20 Feet</u>	<u>18 Feet</u>
Construction (Corps of Engineers)	\$288,000	\$153,000
Preauthorization Studies (Corps of Engineers)	2,000	2,000
Aids to Navigation	<u>1,000</u>	<u>1,000</u>
Total Investment	\$291,000	\$156,000
<u>Annual Carrying Charge</u>		
Interest ($0.02625 \times \text{Investment}$)	\$ 7,600	\$ 4,100
Amortization ($0.00989 \times \text{Investment}$)	2,900	1,500
Maintenance	2,600	1,400
Maintenance Aids	<u>100</u>	<u>100</u>
	\$ 13,200	\$ 7,100

Item 6 - Channel west of Harbor Cove

<u>Investment</u>	<u>Depth</u>	
	<u>20 Feet</u>	<u>18 Feet</u>
Construction (Corps of Engineers)	\$194,000	\$ 74,000
Preauthorization Studies (Corps of Engineers)	1,000	1,000
Aids to Navigation	<u>0</u>	<u>0</u>
Total Investment	\$195,000	\$ 75,000
<u>Annual Carrying Charge</u>		
Interest (0.02625 x Investment)	\$ 5,100	\$ 2,000
Amortization (0.00989 x Investment)	1,900	700
Maintenance	2,100	1,400
Maintenance Aids	<u>0</u>	<u>0</u>
	\$ 9,100	\$ 4,100

Item 7 - Anchorage east of Harbor Cove

<u>Investment</u>	<u>Depth</u> <u>15 Feet</u>
Construction (Corps of Engineers)	\$ 0
Preauthorization Studies (Corps of Engineers)	0
Aids to Navigation	<u>0</u>
Total Investment	\$ 0
<u>Annual Carrying Charge</u>	
Interest	\$ 0
Amortization	0
Maintenance	500
Maintenance Aids	<u>0</u>
	\$500

Item 8 - Anchorage opposite Smith Cove

<u>Investment</u>	<u>Depth 16 Feet</u>
Construction (Corps of Engineers)	\$14,000
Preauthorization Studies (Corps of Engineers)	0
Aids to Navigation	<u>0</u>
Total Investment	\$14,000
 <u>Annual Carrying Charge</u>	
Interest ($0.02625 \times \text{Investment}$)	\$ 400
Amortization ($0.00989 \times \text{Investment}$)	100
Maintenance	1,500
Maintenance Aids	<u>0</u>
	\$ 2,000

Item 9 - Removal of Isolated Rock Shoal

<u>Investment</u>	<u>Depth</u>	
	<u>25 Feet</u>	<u>24 Feet</u>
Construction (Corps of Engineers)	\$187,000	\$ 91,000
Preauthorization Studies (Corps of Engineers)	1,000	1,000
Aids to Navigation	<u>0</u>	<u>0</u>
Total Investment	\$188,000	\$ 92,000
<u>Annual Carrying Charge</u>		
Interest (0.02625 x Investment)	\$ 4,900	\$ 2,400
Amortization (0.00989 x Investment)	1,900	900
Maintenance	0	0
Maintenance Aids	<u>0</u>	<u>0</u>
	\$ 6,800	\$ 3,300

3. The estimate of annual charges for the total modification recommended in the report is given below.

Investment

Construction (Corps of Engineers)	\$1,100,000
Preauthorization Studies (Corps of Engineers)	20,000
Aids to Navigation (Coast Guard)	<u>6,000</u>
Total Investment	\$1,126,000

Annual Charges

Interest ($0.02625 \times \text{Investment}$)	\$ 29,600
Amortization ($0.00989 \times \text{Investment}$)	11,100
Maintenance: Dredging	13,700
Aids to Navigation	<u>600</u>
Total Annual Charges	\$ 55,000

GLOUCESTER HARBOR, MASSACHUSETTS
APPENDIX E

TIDAL DELAY BENEFITS

1. The estimate of the tidal delays and expense is based upon the following consideration:

- a. Allocation of fish cargo landings to the various areas of the harbor.
- b. Allocation of the 1957 vessel traffic to the various areas of the harbor.
- c. Computation of average tidal delay based upon a typical tide curve for Gloucester Harbor.
- d. Computation of average hourly operation cost for vessels.

2. The allocation of domestic fish cargo landings to the various areas of the harbor was predicated upon the amount of fish claimed landed by the various concerns located along the waterfront. Statistics on the amount of fish handled are contained in the brief submitted by local interests at the hearing held on November 7, 1956. The allocation of the fish landed is as follows:

<u>Area</u>	<u>Fish Landed</u>	
	<u>Tons</u>	<u>Percent</u>
1. West of Harbor Cove	8,000	10%
2. Harbor Cove	22,060	25%
3. North Waterfront Channel and North Side of State Fish Pier	46,455	55%
4. South Side of State Fish Pier	10,000	10%
Totals	86,515	100%

3. The allocation of domestic vessel traffic to the various areas of the harbor was based upon the percentage of fish cargo landed in each area as applied to the vessels of a given draft. The domestic vessel traffic to the various areas of the harbor is therefore estimated to be as follows:

<u>Draft (feet)</u>	<u>Total Trips</u>	<u>Area 1 (10%)</u>	<u>Area 2 (25%)</u>	<u>Area 3 (55%)</u>	<u>Area 4 (10%)</u>
15	2,706	271	676	1,488	271
14	17	2	4	9	2
13	22	2	6	12	2
12 and under	<u>10,304</u>	<u>1,030</u>	<u>2,576</u>	<u>5,667</u>	<u>1,031</u>
Totals	13,049	1,305	3,262	7,176	1,306

4. Waterbourne commerce statistics on vessel traffic do not agree with data from U. S. Fish and Wildlife Service daily reports of fish imports or local reports of vessels docking. While the vessel traffic figures agree with regard to the number of trips made, it appears that the drafts reported for foreign vessels by the Bureau of Census are 2 to 3 feet low. This discrepancy is evident when it is considered that the 1959 census report shows no foreign vessel with a draft over 15 feet but on 1 July 1959 6 vessels unloaded 2,250 tons of imports, an average of 375 tons each. The loaded draft for vessels visiting Gloucester of this capacity is about 17 feet.

5. An analysis of available statistics, U. S. Fish and Wildlife Service daily reports, and local docking reports was made for vessels in foreign commerce at Gloucester for the year 1957. The following table shows the corrected vessel trips and drafts and the estimated additional trips in foreign commerce expected to follow completion, in 1961, of the new terminal on the south channel (Area 4). All the 1957 foreign traffic used the North waterfront channel (Area 1), the estimated additional traffic is expected to use the South channel (Area 4).

<u>Draft (feet)</u>	<u>1957 Vessel Trips</u>			<u>Corrected Foreign</u>	<u>Estimated Additional</u>
	<u>Foreign</u>	<u>Domestic</u>	<u>Total</u>		
21				2	**
18					8
17	6	0	6	53	50
16	35	0	35	78	44
15	51	2,706	2,757	35	0
14	67	17	84	42	10
13	19	22	41	30	9
12	44	()	()	59	4
11	78	(10,304)	(10,557)	66	1
10 and under	<u>131</u>	()	()	<u>66</u>	<u>19</u>
Totals	<u>431*</u>	<u>13,049</u>	<u>13,480</u>	<u>431</u>	<u>145</u>

* Includes 155 U. S. Vessels inbound, 138 foreign vessels in and out.

** Foreign commerce was 41,854 tons in 1957. Increased commerce due to new terminal is estimated at 15,900 tons.

6. The average tidal delay suffered by vessels was based upon a typical tide curve for Gloucester Harbor and is tabulated as follows:

<u>Feet of Tide Required</u>	<u>Average Delay in Hours</u>
1	0.3
2	0.6
3	1.0
4	1.4
5	1.8
6	2.4
7	3.1
8	4.0
8.5	4.8
8.7	6.2

7. The detail computation of the tidal delay expense for improvement of areas designated as Items 1, 2, 2a, 3, 5, and 6 is set forth in the following tables.

Annual tidal delay expense for improvement designated as Item 1, Gloucester Harbor, Mass.

1957 DOMESTIC TRAFFIC

Draft feet	Hourly Operating Cost	EXISTING CHANNEL 15' (Controlling Depth)			IMPROVED CHANNEL 20 feet			22 feet			Remarks
		Number of trips	Average delay per trip (hours)	Expense	Number of trips	Average delay per trip (hours)	Expense	Number of trips	Average delay per trip (hours)	Expense	
15	25	1,488	1.4	52,080							
14	25	9	1.0	220							
13	25	12	0.6	180							
12 & less	25	<u>5,667</u>	0.3	<u>11,250(1)</u>							(1) Based on 1500 trips 12' draft
Total Domestic Traffic		7,176		\$63,730							

1957 FOREIGN TRAFFIC

21	\$29	2	5.0(2)	\$ 250	2	1.8	\$ 90	2	1.0	\$50	(2) Enters at high tide with 2.5' clearance under keel or navigates left quarter of channel
20		0	5.0(2)	0	0	1.4	0		.6	0	
19		0	4.0	0	0	1.0	0		.3	0	
18		0	3.1	0	0	0.6	0		0	0	
17	25	53	2.4	3,180	53	0.3	400				
16	25	76	1.8	3,510	76	0	0				
15	25	35	1.4	1,220							
14	18	42	1.0	760							
13	18	30	0.6	320							
12	18	59	0.3	320							
11		66	0								
10 & less		<u>66</u>									
Total Foreign Traffic		431		\$ 9,560			\$490			\$50	
Total All Traffic				\$73,290			\$490			\$50	

Annual tidal delay expense for improvement designated as Item 2, Gloucester Harbor, Mass.

EXISTING CHANNEL					IMPROVED CHANNEL					
14' (Control Depth)					16 feet		18 feet		20 feet	
Draft feet	Hourly Operating Cost	Number of trips	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense
15	25	271	1.8	\$12,200	1.0	\$6,775	0.3	\$2,030		
14	25	2	1.4	70	0.6	30	0	0		
13	25	2	1.0	50	0.3	15				
12 & less	25	<u>1,030</u>	0.6	<u>4,500(1)</u>	0	<u>0</u>				
Totals		1,305		\$16,820		\$6,820		\$2,030		

NOTES: 4' under keel

(1) Based on 300 trips 12' draft

Annual tidal delay expense for improvement designated as Item 2a, Gloucester Harbor, Mass.

EXISTING CHANNEL							IMPROVED CHANNEL						
14' (Control Depth)					16 feet		18 feet		20 feet		22 feet		
Draft (feet)	Hourly Operating Cost	Number of trips	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	
Foreign Vessel Traffic - Anticipated to result from construction of new terminal													
19		0					1.8		1.0		0	0	
18	\$25	8	4.0	\$ 800	2.4	\$ 480	1.4	\$ 280	0.6	\$120	0	0	
17	25	50	3.1	3,870	1.8	2,250	1.0	1,250	0.3	370			
16	25	44	2.4	2,640	1.4	1,540	0.6	660	0	0			
15	25	0	1.8	0	1.0	0	0.3	0					
14	18	10	1.4	250	0.6	110	0	0					
13	18	9	1.0	160	0.3	50							
12	18	4	0.6	40	0	0							
11	18	1	0.3	10									
10 & less		19	0	0									
		145		\$7,770		\$4,430		\$2,190		\$490		0	

Domestic Vessel Traffic - 1957

15	25	271	1.8	\$12,200	1.0	\$6,775	0.3	\$2,030						
14	25	2	1.4	70	0.6	30	0	0						
13	25	2	1.0	50	0.3	15								
12 & Less	25	1,031	0.6	4,500(1)	0	0								
Totals		1,306		\$16,820		\$6,820		\$2,030						

NOTES: 4' under keel

(1) Based on 300 trips 12' draft

Annual tidal delay expense for improvement designated as Item 3, Smith Cove

EXISTING CHANNEL					IMPROVED CHANNEL		
15' (Control Depth)					16 feet		
Draft (feet)	Hourly Operating Cost	Number of trips	Average delay per trip (hours)	Expense	Number of trips	Average delay per trip (hours)	Expense
17	\$40						4' under keel
16	40						
15	25						
14	25						
13	25						
12 & less	25	2,000	0.3	\$15,000	2,000	0	0

Hearing Page 4 - Rocky Neck Ship Yards, Inc. Rocky Neck 3 railways, two 350 tons capacity, one 650 tons. Has wet and dry storage for 50 trawlers and yachts.

Page 3 - Gloucester Marine Railways Inc. 9 Wharf St. 4 railways - 350 tons capacity each.

Schedule C
Appendix - Gloucester Marine Railways Corporation & Rocky Neck Shipyards, Inc., two affiliated corporations with the exception of two small yacht yards it is claimed that the two above named corporations are the only commercial shipyards in Gloucester and in the vicinity from Boston, Mass. to Portland, Me. The yard at Rocky Neck was contemplating a certain amount of expansion. Average number boats serviced in past 5 years 3000 both yards. In above benefit computation it is assumed that 750 boats with drafts of 12 feet are serviced per year. It is further assumed that 500 vessel trips will be made annually to the other terminals on this channel.

Annual tidal delay expense for improvement designated as Item 5, Harbor Cove

EXISTING CHANNEL					IMPROVED CHANNEL			
Draft (feet)	Hourly Operating Cost	16' (Control Depth)			18 feet		20 feet	
		Number of trips	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense
15	25	676	1.0	16,900	0.3	5,070		
14	25	4	0.6	60	0	0		
13	25	6	0.3	40				
12 & less	25	<u>2,576</u>	0	<u>0</u>				
		3,262		\$17,000		\$5,070		

4' under keel

Annual tidal delay expense for improvement designated as Item 6, West of Harbor Cove

Draft (feet)	Hourly Operating Cost	EXISTING CHANNEL			IMPROVED CHANNEL		
		15' (Control Depth)			18 feet		20 feet
		Number of trips	Average delay per trip (hours)	Expense	Average delay per trip (hours)	Expense	Average delay per trip (hours) Expense
15	25	271	1.4	9,490	0.3	2,030	
14	25	2	1.0	50	0	0	
13	25	2	0.6	30			
12 & less	25	<u>1,030</u>	0.3	<u>2,250(1)</u>			
Totals		1,305		\$11,820		\$2,030	

NOTES: 4' under keel

(1) based on 300 trips 12 foot draft

5. A breakdown of hourly operating cost for typical vessels landing cargo at Gloucester is as follows:

	Swivel-519 Net Tons 175' 35.8 - 19.1 Draft 17'	100 foot Trawler
Assumed cost to replace	\$840,000	\$250,000
Crew	15 men	11 men
Interest (4%)	33,600	10,000
Depreciation (25 year life)	33,600	10,000
Wages (@ \$6000 per man per year)	90,000	66,000
Subsistence	15,000	12,000
Ships supplies exclusive of fuel	30,000	20,000
Fuel	30,000	20,000
General repairs	30,000	20,000
Insurance	10,000	5,000
Marine ashore cost	20,000	10,000
Total Annual Operating Cost	\$292,200	\$173,000
Daily cost based on 300 days	975	580
Hourly cost based on 24 hours	40	25
<u>At Sea Cost for tidal delay estimates</u>		
Wages	90,000	66,000
Subsistence	15,000	12,000
Fuel	30,000	20,000
General Repairs	30,000	20,000
	\$165,000	\$118,000
Daily cost based on 200 days at sea	825	590
Hourly operating cost at sea	34	25
Foreign Registry Vessels @ 65% of American Cost	22	16
<u>Average Cost for vessels visiting Gloucester</u>		
155 of 431 trips were by U.S. vessels		
155 @ 34 =	5,260	
276 @ 22 =	6,072	
431	11,332/431	25
155 @ 25 =	3,875	
276 @ 16 =	4,416	
431	8,291/431	18



ADDRESS ONLY THE
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS

NORTHEAST REGION
(REGION 5)
MAINE
NEW HAMPSHIRE
NEW YORK
VERMONT
PENNSYLVANIA
MASSACHUSETTS
NEW JERSEY
RHODE ISLAND
DELAWARE
CONNECTICUT
WEST VIRGINIA

October 10, 1960

Division Engineer
New England Division
U. S. Corps of Engineers
424 Trapelo Road
Waltham 54, Massachusetts

Dear Sir:


This letter constitutes our report on your navigation survey study of improvements to Gloucester Harbor, Massachusetts.

The improvements are intended to provide access channels for larger vessels, a turning basin to facilitate maneuvering of vessels, additional mooring and anchorage areas, and the removal of hazards to navigation. All dredged material will be disposed of at sea.

This Bureau concludes that there will be no adverse effects on the fish and wildlife resources of the area, nor will there be any benefit to local commercial fishermen. The Massachusetts Division of Fisheries and Game concurs in these views. However, several large fish processing plants in Gloucester are dependent upon foreign fish blocks, large quantities of which are shipped into Gloucester. These plants employ significant numbers of local residents and are an important factor in Gloucester economy. The fish blocks are carried by larger foreign vessels which have encountered delays in the past due to lack of turning basins, mooring areas, and deepwater channels. The improvements as proposed would be of benefit to this segment of the industry, and, therefore, to the economy of Gloucester. We have not evaluated these industrial benefits. No further studies by this Bureau will be required unless your plans for improvement are altered.

The opportunity to report on this project is much appreciated.

Sincerely yours,


John S. Gottschalk
Regional Director

GLOUCESTER HARBOR, MASSACHUSETTS
Information Called for by
Senate Resolution 148, 85th Congress
Adopted 28 January 1958

1. NAVIGATION PROBLEMS

Gloucester Harbor, Mass. is located at the southern extremity of Cape Ann about 25 miles northeast by water from Boston Harbor. The principal industries are fishing, fish imports from foreign countries, extensive boatyard and marine railway activity and manufacturing.

2. The chief difficulties of navigation are the result of:

- a) inadequate depths in the entrance channel and access channels along the waterfront for present and prospective vessel traffic to navigate without delays, and
- b) the presence of rock shoals that are a hazard to vessel traffic

3. IMPROVEMENTS CONSIDERED

Local interests requested overall improvement of the harbor. The specific requests and other improvements considered are listed below:

- Item 1. Dredging channel from entrance to northwest of Fish Pier to 22 or 20 feet.
- Item 2. Dredging channel 150 feet wide to southeast of Fish Pier to 18 or 16 feet.
- Item 2a. Dredging channel 200 feet wide to southeast of Fish Pier to 18 feet.
- Item 3. Dredging channel into Smith Cove to 22 or 16 feet.
- Item 4. Removal of ledge off Empire Fish Co. wharf.
- Item 5. Dredging channel into Harbor Cove to 20 or 18 feet.
- Item 6. Dredging channel west of Harbor Cove to 20 or 18 feet.
- Item 7. Dredging anchorage east of Harbor Cove to 15 feet.
- Item 8. Dredging anchorage opposite Smith Cove to 16 feet.
- Item 9. Removal of isolated rock shoal to 25 or 24 feet.

The hydrographic survey shows that the ledge shoal off Empire Fish Co. wharf lies within the limits of the berthing space for this wharf. Therefore no further consideration was given to its removal.

4. RECOMMENDED IMPROVEMENT

To reduce tidal delays and hazards to navigation in Gloucester Harbor, it is recommended that the existing Federal navigation project for Gloucester Harbor, Mass. be modified to provide:

- a. An entrance channel into the inner harbor 300 feet wide and 20 feet deep with a turning basin 600 feet wide.
- b. An access channel 200 to 250 feet wide and 20 feet deep along the waterfront to the northwest of the Gloucester Fish Pier.
- c. An access channel 200 feet wide and 20 feet deep along the waterfront to the southeast of the Gloucester Fish Pier.
- d. An access channel varying from 650 to 300 feet wide and 16 feet deep extending into Smith Cove.
- e. An access channel varying from 500 to 100 feet wide and 18 feet deep along the waterfront west of Harbor Cove and into Harbor Cove.
- f. An anchorage of about 5 acres 15 feet deep east of the entrance to Harbor Cove.
- g. An anchorage of about 10 acres 16 feet deep opposite the entrance to Smith Cove.
- h. Removal of the isolated rock shoal adjacent to the entrance channel south of Harbor Cove to a depth of 24 feet.

Estimated first costs, annual costs and annual benefits are based on November 1960 price levels; a 50-year project life, and a 2-5/8 percent interest rate on Federal funds. The estimated costs are as follows:

a. Estimated First Cost of Construction

Federal	\$1,126,000
Non-Federal	<u>0</u>
Total Estimated First Cost of Construction	\$1,126,000

b. Estimated Annual Charges

	<u>Federal</u>	<u>Non-Federal</u>	<u>Total</u>
Interest and Amortization	\$40,700	0	\$ 40,700
Maintenance	<u>14,300</u>	<u>0</u>	<u>14,300</u>
Total Estimated Annual Charges	\$55,000	0	\$ 55,000

c. Estimated Annual Benefit

<u>General</u>	<u>Local</u>	<u>Total</u>
\$ 164,800	0	\$ 164,800

d. Benefit-Cost Ratio = 3.0

5. APPORTIONMENT OF COST AND LOCAL COOPERATION

In view of the nature of the benefits, which are general in nature, no local cash contribution should be required. As a requirement of local cooperation, local interests should:

- Provide without cost to the United States all lands, easements, and rights-of-way required for construction of the project, and for construction and maintenance of aids to navigation, upon the request of the Chief of Engineers;
- Hold and save the United States free from damages due to the construction works;
- Maintain without cost to the United States depths in berthing areas commensurate with the depths provided in the related project areas;
- If it is determined in detailed studies that spoil disposal areas are needed, provide upon the request of the Chief of Engineers and without cost to the United States, any such areas required including such dikes, bulkheads and embankments as may be necessary for the initial dredging and subsequent maintenance.

6. DISCUSSION

Local interests have been advised of the recommended improvement and have indicated that the requirements of local cooperation would be met. The recommended improvements provide a satisfactory and economically feasible means of meeting the needs of navigation for the present and prospective commerce. Analysis on the basis of a 100-year life would increase the benefit-cost ratio from 3.0 to 3.6. The project is considered justified on the basis of studies and criteria in the report. Proposed local cooperation is consistent with that required in similar projects.